INTEGRATING URBAN LANDSCAPE RESOURCES INTO THE URBAN PLANNING SYSTEMS IN MALAYSIA:
With a Special Reference to the Use of GIS

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I hereby declare that this thesis was composed by me and the work is my own research

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From a modest beginning as practical steps for fire-prevention in the 1890s, urban planning in Malaysia has matured into a profession concerned with all aspects of development. As in many other developing countries, there are many problems and issues that need almost immediate and simultaneous attention. With limited resources, emphasis has tended to be on socio-economic goals. In the process environmental aspects such as landscape resources have not been given due consideration. The loss of much of these resources as the result of a rapid urban development highlights the need for a new approach to be adopted. The thesis discusses the need for a model to ensure that the concerns of these resources are fully integrated into the urban planning process, and for an approach that must allow for the development of a systematic landscape resources inventory, its presentation and analysis. The dynamic nature of urban development means that the system must also be able to incorporate almost daily updating and analysis. The versatility of Geographic Information Systems (GIS) is well placed to serve this purpose. The study starts with an understanding of the importance of the various landscape resources within the historic Kuala Lumpur Old Town, proceeding to sketch a model that would help to integrate these resources into the existing urban planning system. Using ARC/INFO software, the model demonstrates in sketch outline and by example typical variables of an urban landscape database for Kuala Lumpur Old Town. Using the available planning data applied to 3 case studies. The first of these looks at the Bukit Nenas Forest Reserve, the second at the Kelang - Gombak Rivers Corridor, and the third at the so-called colonial shophouses. All are studied with special reference to the use and application of GIS as a means of integrating such urban landscape resources in the urban planning systems in Malaysia. The thesis concludes with a critical commentary on the likely role of GIS in serving this need.

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CHAPTER 1

BACKGROUND AND FRAMEWORK

INTRODUCTION

Referencing Gutkind (1952), Laurie (1975) details four stages in man's changing attitude toward his environment over the known period of civilization.[1] The first stage being the I-Thou tradition which is characterized by fear of the unpredictable forces of nature. The next stage, where the I-Thou tradition still persists, is when man becomes more confident in himself through better understanding of the process of nature and his limitation to manipulate it. This is a state of equilibrium between man and nature. In the third stage, man increasingly sees nature as a frontier to be conquered and in many cases, subjugated as a result of growing confidence and advancements in industrial technologies. Laurie describes this stage, which he called the I-It relationship, as being symbolized by automobile-oriented, spreading urban regions with hinterlands of felled forests, worked-out mineral deposits, and polluted rivers. This is the relationship reviled by Ian McHarg (1969) in his classic: "Design With Nature".[2] Perhaps McHarg is one of the pioneers that Gutkind prophesied as signaling man's changing attitude toward nature in the fourth stage of the man-nature relationship. In this stage the I-It attitude is seen transformed into renewed understanding into the working of nature resulting in social awareness and more sensitive adjustments to environmental conditions.

The change in man's attitude toward nature entails an incorporation of the interest of nature into the development process, especially at the planning stage. As far back as in 1928, Benton MacKaye wrote "planning is two things: an accurate formulation of our own desires, that is, the specific knowledge of what it is we want, and an accurate revelation of the limits, and opportunities, imposed and bequeathed to us by nature".[3] MacKaye, while highlighting the need for an integrated approach to planning so that "the highest use is secured from its (region's) natural resources as a whole", also emphasized that the regional planners' role is to "find alternatives, not to make them. They must find alternatives that most completely meet the needs of the populous and most nearly reflect the limitations and opportunities of the ecological and resource characteristics of the region".[4] Obviously critics will point out that MacKaye's approach is still man-centred, but credit must be due to him for being among the pioneers to draw attention to the concept of resource capacity.

The failure to heed McKaye's warning was summed up by Lewis Mumford (1966) when he said "that voice was needed in 1928, and because it was not listened to, it is needed even more today".[5] This thesis is only one among many efforts in the quest for a more responsible approach to the planning and management of our limited resources - specifically urban landscape resources.

DEFINITIONS

In order to set the scope and limits of the study, it may be helpful to define a few critical terms so that ensuing discussions will have a common basis. Laurie, M. (1975) described the term landscape as follows:

> **"Land becomes landscape when it is described or seen in terms of its physiographic and environmental characteristics. Landscape varies according to these characteristics and according to the historical impact of man on it. Thus landscape is a reflection of dynamic, natural and social systems".[6]**

Beside the implication the land is "inorganic or dead" and that landscape is "organic or alive, there are two other important implications of the above definition: Firstly, a landscape only exists when its physiographic and environmental characteristics are there to define it. Secondly, a landscape has an historical aspect to it. While the first are the entities of it, the second represent the value that man associates with it. An entity only becomes a "resource" if it is "useful and finite". Thus a "landscape resource" is an entity which is useful and finite to the landscape (Smardon, 1975).[7] The qualifier "urban" is added to emphasize the locational aspect of a landscape that is generally found within the confines of an urban area.

Basically, there are two types of urban landscape resources: natural and cultural. Natural landscape resources occur either because of the special environmental conditions that enable them to develop their distinctiveness, such as plant communities that have colonised the abandoned spaces within the city. Others may occur because they are remnants of the native plant communities before the area was overwhelmed by urban development. There may also be other natural features such as a river system that runs through the urban area.

Urban cultural landscape resources are the result of human habitation and associated activities in an urban area such as buildings, streets, town squares, gardens and open spaces, bridges, and piers. Some of these may have historical importance to the local community such as a courthouse, government building, cemetery or parade ground. Others are just ordinary and mundane structures and elements to enable urban living such shophouses, markets, roads and bridges. Some are sites or locations of important events in the development of the local community. Others are important because of their socio-cultural values such as religious buildings and club houses.

IMPORTANCE OF URBAN LANDSCAPE RESOURCES

Worstkett, R. (1969), one of the first practising urban conservation planners in the United Kingdom, was quoted by Kain, R. (1981) as saying: "Society needs both cultural and physical roots and a town's visual and historic qualities can satisfy at least part of this need."[8] This sentiment was echoed by Lowenthal, D. (1975) when he observed that "we need the past ..... to cope with our present landscapes".[9] Schlereth, T.J. (1980) was also quoted as saying: "We selectively perceive what we are accustomed to seeing; features and patterns in the landscape make sense to us because we share a history with them. Every object, every grouping, every view is intelligible partly because we are already familiar with it, through our own past and through tales heard, books read, pictures viewed. We see things simultaneously as they are and we view them before; previous experience suffuses all present perception .... Without the past as tangible or remembered evidence we could not function; .... It is incarnate in the things we build and the landscapes we create".[10] Taylor, K. (1992) takes this point further by saying that "man has created historic cultural landscape through the history of his settlement on a piece of land".[11] It follows that socio-cultural values define a cultural landscape resource.

All the above quotations only show that we need our urban cultural landscape resources so that we are be able to follow through with our urban life without a sense of displacement or strangeness. They provide us with a feeling of continuity and identity. Kevin Lynch (1972) writing a famous book, "What Time is This Place?" explained this need brilliantly by saying "a sense of the stream of time is more valuable, more poignant and engaging than a formal knowledge of remote periods".[12] He argues that man's effective action and inner well-being depends on his possession of a strong image of time in which a vivid sense of the present is connected to both future and past. He also argued that a city must be a "collage of time" in order that the population may identify with it. The elements of this "collage of time" are what we have called here urban cultural landscape resources.

Over the past decade, the movement toward conservation of nature in cities has been very noticeable and strong (Emery, 1986).[13] Urban dwellers are becoming more aware of and sympathetic to the wealth of plant and animal life around them. Tartaglia-Kershaw (1982) found that people in Sheffield saw a woodland as a resource providing continuity and links with their past childhood. The woodland influenced residents' development of identity with place and community, stimulating feelings of security and a desire to stay in the area.[14] Emery (1986) suggested other benefits of conserving nature in cities; the first being educational giving first hand knowledge of wildlife and wild habitat especially to the children; the second being the environmental benefit of wasteland such as derelict railway lines and embankment, gap sites, waterlogged areas and in some cities, derelict former mining land. All these sites have potentials to be used as resources for urban dwellers, so long as they can be made safe (for example, free from toxic waste). If ignored for long enough, waste sites will be colonised by wild plants and animals. By adopting a site and capitalising on this natural process of colonisation, we can help it along and create safe oases of green in place of derelict urban decay. These oases can enrich the quality of the local environment. Nature in cities can also be a haven for urban wildlife. Hanley, J. (1983) discussed in great detail the benefit of nature in the urban environment stressing the ecological importance of such urban landscape resources for the whole urban community.[15]

For a Muslim, there is a religious aspect to the importance of urban natural landscape resources. It would be appropriate to outline this aspect here because Malaysia is by-and-large a Muslim country. Islam places a very high value not only on specially designed and constructed gardens but also on ordinary landscape resources such as green areas, water, and wildlife. In the al-Quran, Allah said:

> **"Corruption doth appear on land and sea because of (the evil) which men's hands have done, that He (Allah) may make them taste a part of that which they have done in order that they may return (to the right path)"** (al-Quran 30:41).[16]

It follows that a Muslim understands that if he is uncaring in relation to the environment, he will be punished for his selfish attitudes. More importantly, the destruction of environment is said to be a form of deviation from the right path, thus a cardinal sin in Islam.

Prophet Mohammed (peace be upon him) laid down very important edicts on the preservation and conservation of urban landscape resources.[17] By designating the holy cities of Makkah and Madinah, as al-Haramain (singular: al-harim), he ensured the protection of plant communities within it by prohibiting their uprooting, felling, or even detaching a leaf.[18] He also made the conservation of a forest around the city Taif part of an agreement in accepting the surrender of the town after the battle of al-Hunain. This included the prohibition of hunting of wildlife within the forest.[19] He ordered the preservation of natural areas along natural water-courses and that no livestock was to graze in areas designated as al-Hima (or nature reserve) during the flowering seasons so that the bees will have abundant stock of nectar for honey.[20] The prophet (p.b.u.h.) also encouraged his followers to plant trees in replacement to the ones felled. Anas bin Malik recorded the prophet (p.b.u.h.) as saying "No Muslim that plants a tree or works a piece of land, and humans, birds, and wildlife eat from them, except that charity will be recorded of him".

The prophet (p.b.u.h.) was closely followed by those that came after him. Records showed that Omar, second Caliph, ordered the replanting of trees in a forest on the edge on Madinah and that Othman, the third Caliph, spent much of his own money in planting trees in an area called al-Ghabah, near the holy city of al-Madinah.

Ibn Masoud, one of the most influential scholars of the Hanafi school, said that "a traveller should not stop at a place where there is no stream with clean running water, a market place and a local ruler".[21] This shows that a river or a stream is considered as a very important part of an urban environment. On urban green space Abu Yusouf Yaqub, another very highly regarded Islamic scholar, said: "If there is a vacant space within a built-up area, and there is no use being put to it, then a hypothetical use would have to be found for it so that it should always be for the benefit of the community".[22] This ruling was codified in Article 5 of the Land Code of the Ottoman Empire of 1858 which said that: "If there is an unoccupied space in between dwelling or buildings, that space should not at all be considered a dead space. In fact it should made to benefit the general community, and nobody is allowed to make it his personal possession, and it cannot be alienated to an individual. If an alienation had been made, it must be rescinded, and if a dwelling had been constructed without permission over it, the house must be demolished".[23] This land code also prohibited the allocation of river banks and sea shore to private ownership. The same prohibition applied to a water body (Article 1237, and 1238). The fact that urban green spaces and natural features were included in the constitution of one of the greatest Islamic empires in history only showed the importance that Islam places on these resources.

In the case of derelict land, the Prophet (p.b.u.h.) was quoted by Ibn Shuaib as saying "If a person made alive a piece of dead land, for him the reward of this land, and whatever is eaten by any of God's creations (wildlife and human) that look for food on this land, charity will be recorded for him". A Muslim is therefore encouraged to reclaim derelict land and he is not only promised the reward in this world but in the hereafter. This and all the above are done within the context which is central in Islamic doctrine of Man as God's viceregent (or Steward) on Earth. Incidently, McHarg (1969) strongly recommended that the concept of man's stewardship of the Earth should replace the biblical dogma of man as the master of the Earth.[24]

INTEGRATING LANDSCAPE RESOURCES WITHIN THE MAINSTREAM URBAN PLANNING SYSTEM.

McHarg (1969) and others, have eloquently advocated environmental planning and have brought into focus the evolving philosophy that ecological processes provide the indispensable basis for planning and design (Annotated Bibliography). Hough, M. (1984) said: "The dependence of one life process on another; the interconnected development of living and physical processes of the earth, climate, water, plants and animals; the continuous transformation and recycling of living and non-living materials are the elements of the self-perpetuating biosphere that sustain life on earth and give rise to the physical landscape".[25]

It is an obvious conclusion that urban landscape resources, whether they are natural or cultural, are equally important for the sustainance and perpetuation of healthy urban living. If "our primary concern is how a city can be made environmentally and socially healthier; how it can become a civilising place to live in", then the method that enables the incorporation of urban landscape resources into the urban planning process becomes of paramount importance.[26]

Carl Steinitz (1969) traced the history of systematic procedures to environmental planning back to the work of a little known landscape architect by the name of Owen Manning in 1923.[27] Manning's work preceded the publication of MacKaye's "The New Exploration: A Philosophy of Regional Planning" by five years but was relatively unnoticed, perhaps because of his naive attempt to produce a master plan for the whole of the United States of America! In another work, Manning was commissioned by the citizens of his home town, Billerica, to draw up a plan for the expansion of the town. Using the media of a magazine called "Billerica", Manning got the people of the town involved in the planning process, by publishing in each issue, a map of the resources of the town, for example, good soil for agricultural, amenity areas, topography, and farm maps.[28] The resource maps were meticulously drawn on vellum. Explaining to the citizens of Billerica that he was using overlays of these resource maps, Manning produced his proposals at the end of the process, and published them in the last edition of the magazine. It is interesting to note the similarity of this approach with the earlier works by town planners such as Patrick Geddes. Whether Manning was actually influenced by them at all, though an intriguing possibility, remains a speculation.

As Steinitz pointed out, Manning's work was a very significant step forward in environmental planning. This pioneering work in environmental planning was based on an analysis of resources that were available. Not unexpectedly, there were serious flaws in it; the most serious being that Manning did not document the set of criteria he used in making an inventory of each resource; namely, how he had carried out each resource assessment and subsequently how the resources were actually considered in the eventual plan production. Such a fundamental weakness of method clearly cast doubt on the validity of Manning's plan.

In the United Kingdom as the history and origin of both urban planning and landscape architecture were very different from that of America, the evolution of systematic landscape resources assessment took a very different course.[29] After World War II, British planners evolved and employed a technique very different from that of Manning. Conveniently the technique acquired the name of "sieve map analysis" because it worked by sieving out areas that should not be developed for one reason or another; positive and/or negative. The main disadvantage of the technique was that once sieved out, an area tended to be left without any mention of its management unless the planners thought that the area could have an alternative use, for example, as green belt. Steinitz (1979) called this technique the "Thou shall not" approach to planning.[30] The main criticism of this technique must be in the main thrust of the analyses. In this technique, the main aims of the planners involved were usually only to find areas that were suitable for housing, industrial and other urban uses. Landscape resources were seen only as supporting those uses, thus condemning them to secondary roles in a planning process. This is despite the consciousness of the need for a balanced urban environment through urban planning pioneered by such men as Patrick Geddes and Ebenezer Howard.

Sieve mapping did bring significant improvement to urban planning but database management, analysis and output were still very much inhibited by the manual methods of their assessment and analysis. This problem was to a large extent solved by computerising them as in the work of Steinitz et al. in 1968 with a computer programme called GRID.[31]

The advancement of computer technology has been matched by an equally enthusiastic advancement in the development of landscape resources assessment models (see Annotated Bibliography). These models are increasingly being used to predict changes to spatial distribution of resources if certain events are taking place, either simultaneously or in concordance, individually or collectively. Based on a systematic use of databases, this emerging technology is called Geographic Information System (GIS). Aronoff, S. (1989) defines a Geographic Information System (GIS) as "a computer-based system that provides the following four sets of capabilities to handle geo-referenced data: input; data management; manipulation and analysis; and output".[32] Geographic Information Systems (GIS) can help the urban planning process; from data inventory up to the evaluation of policies developed. It does the latter by being able to simulate any number of scenarios as the result of adopting certain development policies. As the technology forms the main tool of investigation and analysis in this thesis, a more detailed discussion of the concepts and operations of the technology will be made in Chapter 4.

THE SETTING: MALAYSIAN URBAN PLANNING ENVIRONMENT

In the early 1890s, an order was given to the mainly Chinese migrant population of Kuala Lumpur (Fig. 1.1) to replace their timber and "<u>attap</u>" shophouses with brick and fired-clay tile structures.[33] The order came directly from Sir Frank Swettenham, the first Resident-General of the newly formed British Protectorate of the Federated Malay States. He also ordered that the rows of shophouses be built in regular rows according to a prepared plan. This drastic step was taken to combat the fire hazard that had on several occasions destroyed large parts of the city. To oversee the orderly development of the city, Swettenham set up the Kuala Lumpur Sanitary Board which, as the name implied, was mainly responsible for municipal health and safety. To carry out this responsibility, it instituted a number of decrees that controlled the development of the city. Among the tools of development control were: firstly a maximum length for the rows of the shophouses; secondly

Fig. 1.1: **The Malay Peninsular**: Showing Kuala Lumpur in relation to other major towns in the peninsular. Taiping, Ipoh, Kuala Kubu Baharu, Raub and Kuala Lumpur were tin-mining towns, while Seremban, Tampin, Keluang, Labis, Mentakab, Gua Musang, Temerloh, Sungai Petani, Baling were based on the growth of rubber industry.Refer also to Appendix 3 for detailed map of Selangor.

a minimum distance between blocks of buildings; thirdly a specified width of the back-lanes and fire breaks; fourthly the construction of storm-water drains; and lastly a mandatory covered way along the front of the shophouses that became popularly kown as "kaki lima".[34]

As the Federated Malay States were also proclaimed in 1890, the history of modern urban planning in Malaysia, can be said to have started at about the same time as the development of modern Malaysia.[35] More importantly, it should be noted that Kuala Lumpur was the first Malaysian town and the nucleus of the newly evolved urban system in the country.[36] Other interior, tin mining and rubber-producing centres that were formed at about the same period, such as Seremban, Rawang, Kajang, Ipoh and Taiping (Fig. 1.1) followed broadly the same policy. This fact made the development of Kuala Lumpur central in the evolution of Malaysia's urban system and morphology.

Subsequently, official sanction had to be sought before any new building could be built within the town limit.[37] This rule was applied less rigidly in smaller hinterland centres. Needless to say this decree took a very negative approach to development, that of "control". Since then, urban planning in the country has always played this role rather than the "instigator" of development. In the early 1970s there was a marked shift in the emphasis to a more "development-oriented" planning. A two-tier development plan system was introduced to and adopted in every town and rural district in the country.[38] As in the previous system it was modelled very closely on the British town planning system. At the higher level, there is a strategic plan called a "structure plan" that translates the more general national economic plan into a spatial plan. At the lower level, there are various "local plans" which are interpretive in nature. They translate the policies of the structure plan into programmes of action.

This new approach to planning was brought into the urban planning system with the introduction of the Town and Country Planning Act, 1976 (Act 172). As in the earlier case, this act was accompanied by an act that reformed the role of local government, namely the Local Government Act, 1976 (Act 171). These twin acts of parliament, replaced the old Town Board Enactment, 1935 (F.M.S. Part IX, Cap. 137). While retaining its role as the "control" of development, urban planning has also become the "instigator" of development and this has pertained up to the present. This is done through the structure plan that is based on data and information surveyed before the formulation of the plan. Among the data surveyed are those pertaining to environmental and landscape resources. Also collected is information pertaining to environmental hazard such as land, air and water pollution.

The philosophy behind the development plan system of planning is the need for the plan to be more dynamic and forward looking. It is recognised that a plan for a city cannot be static. It must be able to accommodate and adapt to changes that are brought about by advancements in technology or socio-economic improvements. The system allows for periodical reviews of the plan. Under the above legislation, the review has to be done once every five years. Monitoring land use change forms an integral part of the process whereby policies are reviewed and updated. It sounds all too easy for the authority to carry out such reviews, but experience since the implementation of the relevant acts of parliament has shown the task to be enormous and extremely difficult. Typically it involves the monitoring and identification of emerging land use patterns which are normally linked with other planning statistics such as its impact on natural environmental resources before the full significance of a land use change becomes apparent.

The task of monitoring land use changes are made difficult by a host of factors. Foremost among these factors is the rapid rate of urbanization taking place. This factor, when coupled with the need for investment into a local economy, overtaxes the capability of any local authority to quickly adapt and accommodate within a relatively static development plan.

Equally significant is the impact from the growth of what can be termed "informal sectors" in urban development such as squatter housing, commerce or industries. The authority initially tolerated their existence in recognition of their significant contribution to local industries and employment. As the country develops and urban sectors mature, the consequences of such _laissez faire_ attitudes are now becoming more apparent. It is now recognised that in many instances, these "developments" have constrained actions toward a better planned development. Most of the sites that have become the targets of squatters are unused government land such as former tin mining lands, utility reserves (for examples, electric transmission reserves, telephone grid reserve, and water pipe-line reserves) transportation reserves (for example, railway reserves, and highway reserves), nature reserves (for examples river reserve and forest reserve). All these activities are threatening the stock of urban landscape resources as it is within these lands that their most important elements exist. The Kuala Lumpur Structure Plan, 1984, for example, has recommended making an inventory of all existing "informal sector" development. This inventory was to be used to decide which of them should be relocated, upgraded or even demolished. The plan also recommended an end to official tolerance and sanctioned the use of tough tactics to discourage new squatting activities. So far the record of success in this endeavor is quite dismal.

The cumulative impact of years of _ad hoc_ planning decisions and virtually unrestrained growth of the "informal sectors" on urban landscape resources are difficult to gauge unless an overall study is carried out. In the case of Kuala Lumpur, the opportunity for such comprehensive study was during the preparation of the Kuala Lumpur Structure Plan, 1984. The same was true for many other major Malaysian towns in a period of frenzied activities of structure plans preparation between 1982-1986.[39] These critical opportunities were not fully exploited for several important reasons; the first of these was the socio-economic bias of the studies. Conservative Malthusian dogma that "economic prosperity will sort out everything else" still sway in the minds of many influential urban planners in Malaysia. The second was the general lack of appreciation of the strategic values of environmental planning during those years. The third reason was scarcity of staff with relevant professional training to do the work. These points will be further elaborated in Chapter 3.

There are a few factors that conspire to deprive us of the benefit of strategic planning systems in Malaysia. The first factor relates to most planners' assumption that the subsequent local plans will address all the minor and detailed elements not sufficiently dealt with at the structure plan level; this includes landscape as it is generally considered as a minor element by many Malaysian planners. The statutory requirement of periodical review provides a false sense of security leading to non-action. This makes the new structure and local plans even less reliable references than the old comprehensive plan as far as individual developments are concerned.

Equally important, but presently absent, is a method of forecasting both the likely magnitude and significance of the impact of a planning decision on urban landscape resources accurately. This will enable the planner to forecast the impact of certain courses of action and act accordingly. Alternatively it can also be used to advise political masters against certain expediencies. This last factor is especially important in the "education" of decision-makers in a country that is now steadily appreciating the need for properly planned development programmes.

THE NEED FOR A GEOGRAPHIC INFORMATION SYSTEM (GIS)

With the development of computer-based information technology, a planning tool that is increasingly becoming popular in the developed countries to assist decision-making in the planning process is, as previously mentioned Geographic Information System (GIS). Aronoff, S. (1989) describes a Geographic Information System (GIS) as "designed for the collection, storage, and analysis of objects and phenomena where geographic location is an important characteristic or critical to the analysis". He also added that "while handling and analysing data that are referenced to a geographic location are key capabilities of a Geographic Information System (GIS), the power of the system is most apparent when the quantity of data involved is too large to be handled manually".

The applications of a Geographic Information System (GIS) are diverse, for example:
Firstly in finding the coincidence of factors, such as the areas with certain combinations of soil type and vegetation, or areas in the city with a low development rate and high incidence of dilapidation; Secondly in updating geographic information, such as forest cover maps to show recent incursions, or updating land use maps to show recent conversion of natural landscape areas to residential development or other urban uses; Thirdly in managing municipal services, such as scheduling maintenance activities, or notifying local residents of a rezoning application.

The advent of Geographical Information Systems (GIS) has opened up opportunities for the development of new approaches to processing and recalling geographically referenced data. This greatly improves management, analysis and presentation of large volumes of information required in decision-making processes. The question that arises is whether the quality of planning and the decison-making will be substantially improved with the use of the technology as a main tool. In other words, the litmus test will be whether by employing Geographic Information System (GIS), planning will focus environmental considerations more sharply.

RESEARCH PROBLEM STATEMENT

The development of Kuala Lumpur since its inception in the mid-1800s, has been prodigious. It has grown from a tiny trading post to a city with an area of some 243 square kilometres in a span of just a hundred and fifty years.[40] The early years of its development were characterised by tin mining in areas that have since been incorporated within the city limits (Zen, 1982). The exploitative nature of this industry resulted in thousands of hectares of derelict land of craters and intervening areas almost devoid of vegetation that are more akin to lunarscape. The craters filled with water and are colonized by water hycinth (<u>Eichhornia crassipes</u>) and other aquatic plants creating vast areas of mosquito-breeding habitat. Poor soil areas are either occupied by squatter housing, illegal industries or low cost and low quality housing and those left are colonized by pioneer species such as the <u>Imperata sp.</u> and <u>Ischaemum sp.</u> (Zen, 1982).[41]

The town that developed to service the mining industry grew into a congested commercial and administrative centre. Commercial development grew so fast that it burst through the natural containment of low hills on both sides of the river (Fig. 1.2 and Fig. 1.3). In the process it almost completely obliterated the natural landscape. Miraculously one pocket of relatively undisturbed area (11 hectares) was

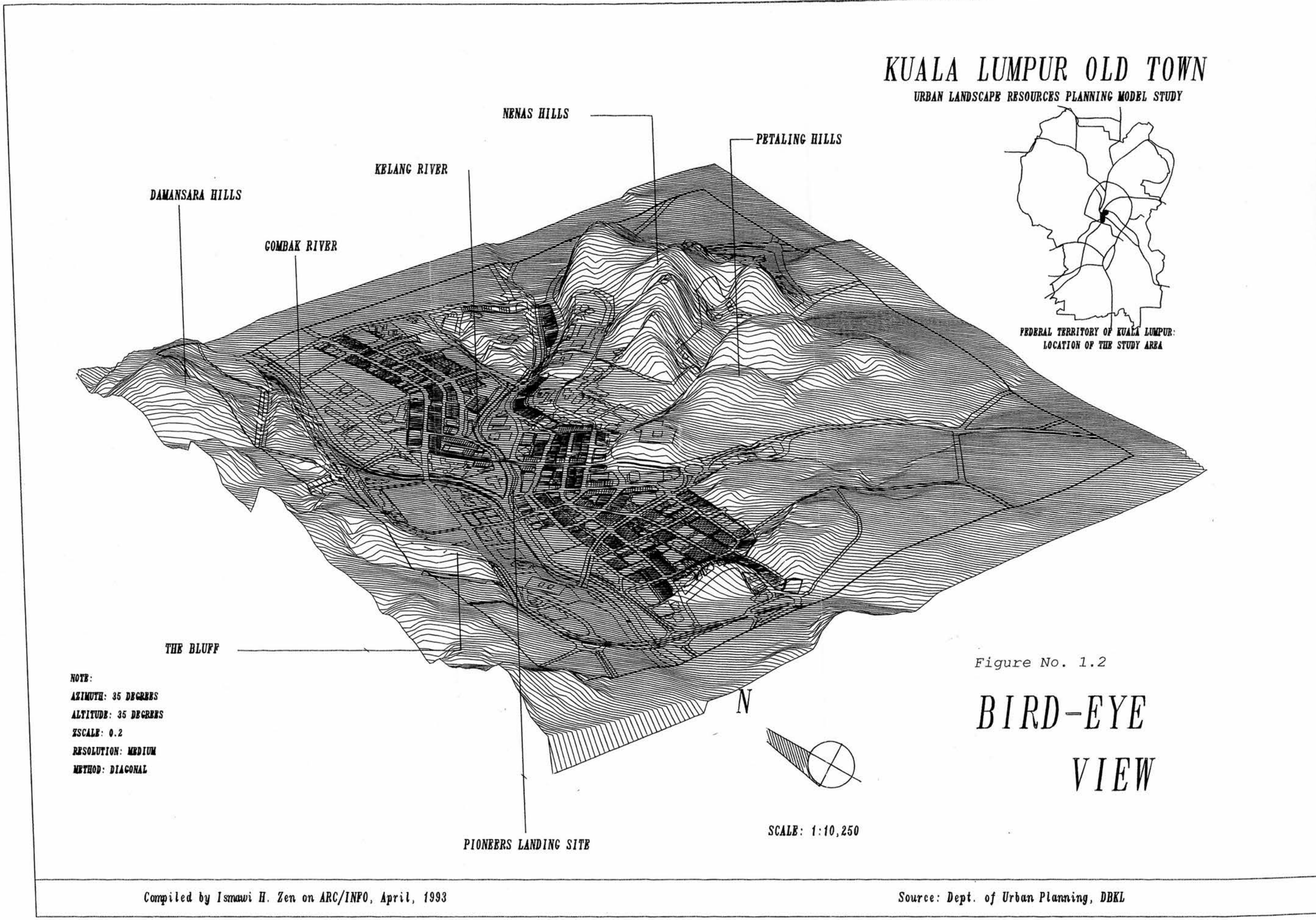


Figure No. 1.2

BIRD-EYE VIEW

left in the area of Bukit Nenas (Fig. 1.3) of the Old Town of Kuala Lumpur. This precious little green was declared a forest reserve in 1904, making it the oldest forest reserve in the country (Teh, 1989).[42]

Mining activities upstream led to the siltation of the historic Kelang - Gombak Rivers system. Housing and industrial developments within the watershed have now replaced mining as the main culprit of river siltation and pollution. These and other new development caused increased surface water run-off. This has greatly upset the capability of the river to drain away excess water. Effluvia from town centre development and from pockets of squatter settlements on its banks have also greatly polluted the river. Both factors have led to frequent floods even after light rain. Engineering solutions to these problems have always been favoured and have ultimately led, in the last few years, to the containing of the river within concrete walls in order to speed up the water discharge. This solution has resulted in some cases in the waiving of a required width of 1 chain (about 20 metres) reserve on both sides of the river as the engineers are of the opinion that the buildings or structures are now safe from being swept away by the river. This means that new buildings are now being allowed right up to the edge of the river. Both these developments have resulted in the destruction of much of what is left of the landscape resources within what used to be the river reserve. The transformation of the historic river into little more than a huge monsoon drain is itself a major loss of an urban landscape resource.

Kuala Lumpur is a city born out of a mixture of colonial enterprise and exploitation. Even though political and economic pragmatism has led to its continuation as the national capital after independence in 1957, the stigma attached to its history has still not been completely laid to rest. This is especially apparent in the attitude towards its historical buildings and spaces. The Kuala Lumpur Structure Plan, 1984, has, for example, sent confusing signals as to the future of its rows of two to three storey colonial shophouses. While advocating that future development of the national capital should reflect the diversity of its alien and indigenous cultures, it is also calling for the replacement of this unique architecture with tall buildings designed in the international architectural style "to enhance the image of the nation's commercial centre" (DBKL, 1984).[43] In countering such ambivalence, there is then a need to present and emphasize these historical assets as a vital part of the country's cultural urban landscape resources and of its national heritage.

The planners have been slow to realise the overall effect of their actions. This is especially true in the devastation to the surviving urban character brought about by the implementation of the so-called "set-back" regulation. This rule made it compulsory for a building to be set back twenty-feet from the road edge when being renewed or modernized. This has caused gaps and breaks in the continuity so essential to the urban character of the colonial shophouses locality. It has also exposed party-walls of adjoining buildings resulting in the deterioration of the walls. Exposed surfaces are colonized by mosses and sapraphitic plants causing further damage. Recent developments indicate that the authority is having a rethink on this rule. However, until such time as it is changed, architects and owners remain hesitant to challenge it for fear of having to make extra effort in getting planning approval.

New buildings replacing the old are often totally unrelated both in terms of scale or architectural style to their surroundings. Many of the surviving buildings in the old town are important as elements of the urban cultural landscape resources of the country, either individually or in groups. This importance is seldom recognised; indeed usually ignored in many planning decisions on individual development applications.

In addition to older buildings and street artifacts, there are also urban spaces historically important in the old town of Kuala Lumpur. Not only are they important in the character formation of the old city, but they have practical usefulness as congregation and meeting places. However, they are also under threat from development. In a very motor-orientated society, they have become favourite targets for traffic management solutions to urban congestion. Over the years, many of these urban landscape resources have been lost.

Recently tourism of both local and overseas visitors has become a very important element in the economy of the country. While it has been the saviour of some cultural resources such as the colonial shophouses and historical buildings, it has also become a scourge to others, especially the natural landscape resources. While the former seem to have gained a temporary reprieve and perhaps a new lease of life from this new industry, the latter undoubtedly are being put under severe strain. Over-exploitation, over-enthusiasm and unsympathetic developments are major causes. One example of this insensitivity must be the development of an artifical waterfall by carving out the natural slope of Bukit Nenas on the top of the junction of Ampang Road and Campbell Road (Chapter 6).

However lately there are signs that things are changing for the better. The creation of an Urban Design and Conservation Unit within the Department of Planning in the City Hall of Kuala Lumpur augurs well for the future of landscape resources within the city. At the moment it is concentrating all its effort on the old colonial shophouses but in time it will embrace within its jurisdiction the conservation of all other urban cultural landscape resources of Kuala Lumpur. Ways have to be found to coordinate this effort with that of the Landscape Design and Recreation Department of the City Hall (Appendix 1).[44] Perhaps then the latter will upgrade its role from purely ornamental horticultural design to one which is concerned with all aspects of landscape management.[45]

The momentum towards environmental consciousness within the government may be traced back to the change of national leadership in the early 1980s.[46] Since then the Federal Government has been actively encouraging local authorities, especially those in major cities and towns to care more about the environment within their areas of jurisdiction. This is especially true in the case of the national capital which had an annual budget of more than M$100m for landscaping work in 1989.[47] In fact in 1989, the city was spending about M$23m for the development and maintenance of its five major parks alone (Hussin, 1989).[48] It would probably be appropriate to mention that Kuala Lumpur is being promoted in the international tourist market as the "Garden City of Lights".[49]

Planning authorities such as the City Hall of Kuala Lumpur are now being required to be more sensitive not only to socio-economic but also to physical and environmental changes. Effort must now be made to improve the momentum and direction of these changes so that genuine gains are made in term of the use and conservation of the surviving urban landscape resources.

There has also been a marked change in the attitude of the planning authority towards development planning in recent years. A traditional emphasis on a "master plan" concept has been overtaken by one of a "dynamic plan". It has shifted the bias away from the "end-state" view towards the "continuous" approach to planning (Yaakub, 1992).[50] This change has brought about the possibility of amending the plan to address situations that arise.

There is, therefore, a need for a method to assess the goal achievement and impact, either singularly or cumulatively, of all planning exercises against long term and strategic environmental goals. Assembling and maintaining a database suitable for supporting decision-making is one important step towards the fulfilment of this task. The local authority should also be capable of undertaking systematic evaluation of alternative policies, objectives and projects that are suitable for local conditions. To ensure that it is efficient and effective in performing these roles and functions, the local authority should have adequate skilled manpower and utilise an appropriate methodology to handle such tasks.

The focus of this study then is on the development of a method that will substantially enhance the decision-making process in relation to the use and conservation of urban landscape resources within the Malaysian urban planning systems.

AIMS OF THE STUDY

An overview of the plight of urban landscape resource management indicates the need not just for changes of attitudes to the mechanism of urban planning in Malaysia, but a real change in the process itself. Planning and decision-making will have to adopt a more systematic approach. Spatial analysis of resources must be able to highlight not only the potentials and advantages but also the few implications of certain courses of action. Some forms of resources and/or ecological cost-benefit analysis must be an essential part of the whole planning exercise for future development and for routine development control. With these considerations, this thesis aims:

> **"to demonstrate how the conservation and management of urban landscape resources may be improved through the application of an integrated planning information system".**

Urban landscape resource modelling and urban planning needs a large volume of geographically referenced data. Because this data is always in a state of dynamic flux, it is important that it is collected, stored and managed in a systematic way so that it can always be accessed, analysed and updated whenever necessary without affecting its integrity. Geographic Information Systems (GIS) is an evolving technology that has the ability to capture, store, retrieve and manipulate large volume of geographically referenced data in the manner described above. It is apparent therefore that an application of Geographic Information System (GIS) within the overall planning information system of Kuala Lumpur should improve the basis of planning decisions. This study proposes to examine the use of this technology with particular reference to the management of urban landscape resources in Kuala Lumpur Old Town. The technical application of Geographic Information Systems (GIS) will therefore be considered in the context of typical urbanization problems and related planning processes.

To achieve this aim, the following objectives are formulated:

i) to review urbanisation problems and planning processes as a framework for the development of a model that may integrate urban landscape resources into the main body of the urban planning process;

ii) to develop and implement the outline of a structured Geographic Information System (GIS) database needed for urban landscape resource assessment modelling;

iii) within the limits of available data, to use spatial modelling to:

a) make an inventory of an example of existing urban landscape resources and report on their conditions within the selected study area, namely, Kuala Lumpur Old Town;

b) examine the impact of the proposed development plan on these resources;

c) sketch and evaluate alternative solutions;

iv) to generally discuss the current problems and potential of Geographic Information Systems (GIS) as a tool for urban landscape management, based on a study of the historic area of Kuala Lumpur.

SCOPE OF THE THESIS

The scope of this study encompasses three basic areas: The first area of study is the determination of what constitutes urban landscape resources. This includes their roles and functions within an urban ecosystem. Understanding of the methods that have been developed to make inventories of resources and the processes of development policies formulation is vital to establish the theoretical framework on the need for resources in any urban development.

The second area of study concerns the effect and relevance of urban development and urban planning systems in Malaysia on urban landscape resources. It must be appreciated that if the resources are to play a vital role in any future development, then this has be done through the urban planning system. It is important to understand the nature of the forces that shape and influence the Malaysian urban environment so that the critical link between landscape resources and planning can be established.

The third area of study concerns Geographic Information Systems (GIS) as a tool for relating urban landscape resources to planning systems. It is important to investigate the potentials of the technology and how it may be used to improve decision-making within the overall urban planning process, especially in relation to urban landscape resources. Case studies to indicate its application within selected study areas will be used to highlight these potentials.

ORGANIZATION OF THE THESIS

This thesis is presented in three major parts. To enable thorough discussion on a particular subject, each part will be made up of several chapters, which are indicated below:

Part 1: Urban Development and Urban Planning Systems in Malaysia (Chapters 2 and 3).

A review of urbanization in Malaysia, and Kuala Lumpur in particular, will be discussed in Chapter 2. This review will illustrate the evolution of urban morphology of Kuala Lumpur Old Town. Issues related to urbanization and urban management will be discussed. From this chapter, it is hoped to identify parameters of an inventory of urban landscape resources within the study area.

Chapter 3 will discuss theoretical aspects of the urban planning process for comparison with the system of planning currently being employed in Malaysia. A review of planned development in the country will illustrate the environment within which the urban planning system has developed. The chapter will also discuss the possible relevance of Geographic Information Systems to planning activities.

Part 2: Outline Development of an Urban Landscape Resources Geographic Information System (GIS) (Chapters 4 and 5)

The combination of the two previous parts should provide the framework for a discussion on the value of Geographical Information Systems (GIS) as a tool for this study and model. Chapter 4 will discuss the definitions, concepts and operations of Geographic Information Systems (GIS).

Chapter 5 will deal with the design and implementation of GIS for an urban landscape resources inventory and of the cartographic and attribute databases which will be used to analyse the physical, sensory and ecological characteristics of the study area. It will also examine the impact of proposed development policies on the area.

Part 3: Case Studies, Findings and Conclusions (Chapter 6 and 7)

Three representative case studies will be discussed in Chapter 6 to indicate the viability and the possibilities of the systems in aiding the urban planning process of the study area.

Chapter 7 will review the prospects of using the GIS technology as a tool in an integrated urban planning information system in Malaysia. Drawing upon the case studies, it will also highlight some of the problems that may be encountered in the use of the technology. It will also identify factors which need to be considered if the the technology is to be employed more widely.

OUTLINE OF RESEARCH METHODOLOGY

The study employs various methods ranging from a simple historical analysis of the phenomena of urbanization to critical analysis of government policies related to urban development. Historical method is used to examine the urbanization process in Malaysia and its morphology. It will also be used to outline the evolution of the urban landscape of the study area. A review of planning in Malaysia, and Kuala Lumpur in particular, will identify the need for better urban management through the integration of urban planning and landscape planning.

Field survey methods were used for data collection especially those relating to land use and cover, vegetation and ecology, buildings and structures. Cadastral information such as buildings and roads acquired from standard maps and topographic information such as contour lines, rivers, and wetland were acquired through standard topographics map produced by the Directorate of Survey and Mapping, Malaysia. Pedological information was abstracted from soil survey reports produced by Selangor Agriculture Department.[51] The Urban Planning Department of the City Hall of Kuala Lumpur was the source of information such as land value, tenancy and ownerships, and parcel boundaries were compiled. Other major sources of information were aerial photographs, photo-mosaics. Ground truth survey was used to check the remote-sensing information. Other information was derived from documentary search involving planning application files, and confidential reports of survey of the Kuala Lumpur Structure Plan, 1984, in the Department of Planning, City Hall of Kuala Lumpur. Historical information relating to land utilisation and historical events were extracted from old books, travellers' journals, old postcards, and books of reminiscences from former expatriates.

In addition to all these sources, a perception survey of 250 respondents picked randomly was used to give an indication of people's perception of urban landscape resources (Appendix 2). The survey was limited to local Kuala Lumpur residents to ensure consistency. Readings for the period between 1986 to 1990 from the three monitoring stations set up by the Department of Environment (DoE) was the source of information related to pollution of the river. Hydrological information was derived from a consultant report and record from the River Kelang Flood Mitigation Unit of the Drainage and Irrigation Department, Malaysia. This data was collated by using GIS techniques and were transfered to computer compatible format using the ARC/INFO system.

Manipulation and retrieval facilities were employed to examine the existing physical and distributional characteristics of urban landscape resources within the study area. The system was also employed to study the impact of the proposed development on the urban landscape resources of the area. More advanced spatial modelling techniques in ARC/INFO were used to generate alternative urban landscape management options and development policies for the area for example in the first case study, namely the Bukit Nenas Forest Reserve. A goal-achievement evaluation was carried out and incorporated within the Geographic Information System (GIS) environment to allow evaluation of each alternative development proposal.

THE STUDY AREA: KUALA LUMPUR OLD TOWN

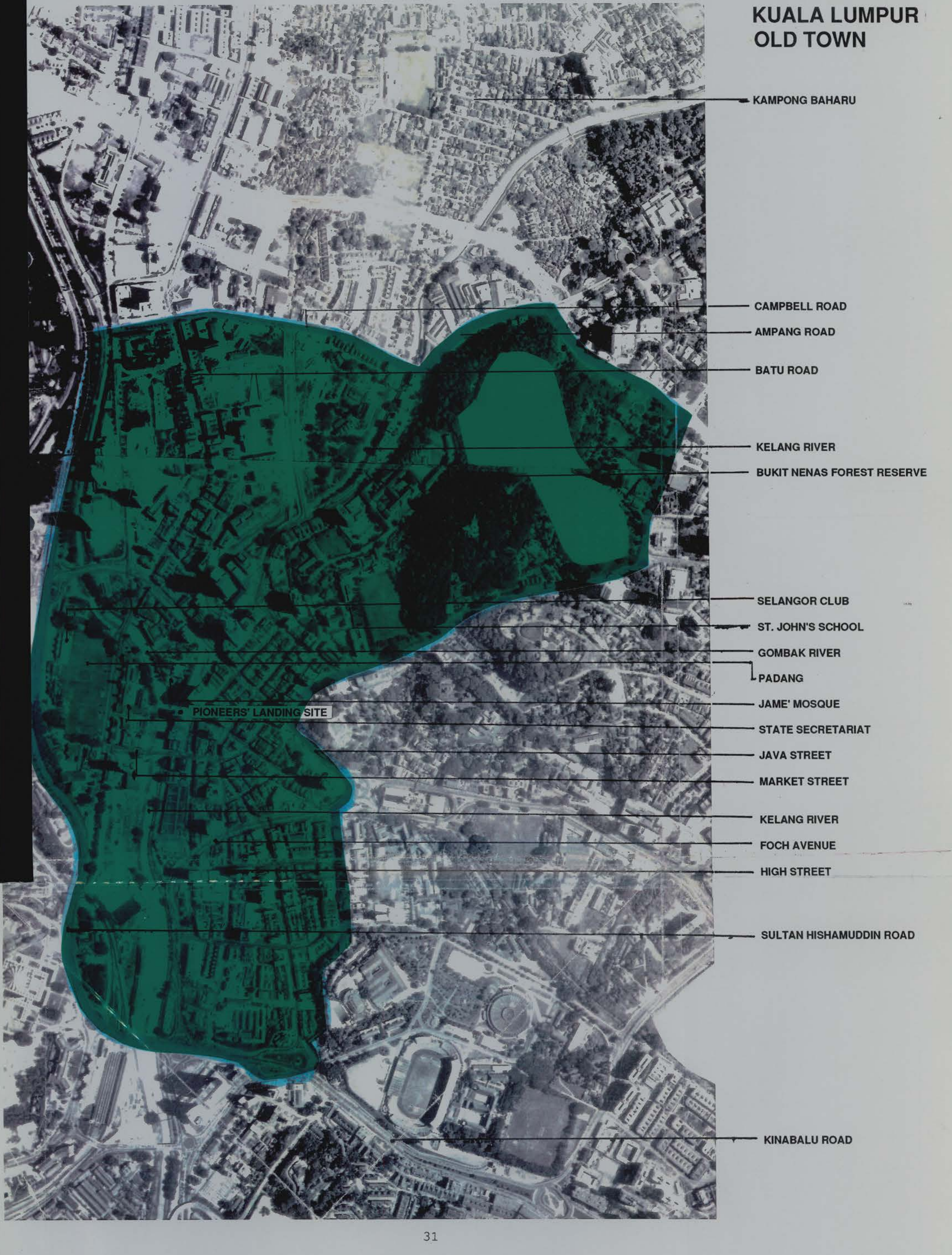
The study area (Fig. 1.3) is made up of basically the old commercial and administrative centre of Kuala Lumpur. This area is bounded by Kinabalu Road in the south, Dang Wangi Road (Campbell Road) - Ampang Road in the north, Sultan Hishamuddin Road - Kuching Road in the west and Sultan Ismail Road - Raja Chulan Road (Weld Road) - Tun Perak Street (Java / Mountbatten Street) - Cheng Lock Street (Foch Avenue) - Sultan Street - Petaling Street in the east (Appendix 4).[52] The historic Kelang - Gombak River flows through the middle of the site. It was at a point on the eastern bank, about a few metres below the confluence where the Kelang River branches into its main tributary, the Gombak River, that the first settlement of modern Kuala Lumpur was founded.

Other than the author's familiarity with the area, foremost among the reasons for the selection of this study area is that it concides with the old city centre of Kuala Lumpur. It has within its boundary, almost all the founding history of the city. The landscape in this part of the city can confidently be termed as the cultural urban landscape of Malaysia; thus a national heritage in its own right.

Kuala Lumpur was the first of the "interior" urban centres that developed from the commercial exploitation of

FIG. 1.3: THE STUDY AREA

KUALA LUMPUR OLD TOWN



the country's natural resources.[53] In time, through the need for centralised control and administration, Kuala Lumpur took up the premier position in this evolving urban system. This position administratively and geographically, gave it the function of a pace-setter for urban development in the whole of the country (Fig. 1.1). Its shophouses, civic buildings and civic spaces influenced the other smaller towns as did the chaos created in Kuala Lumpur by new development, land use and space use reorganization that has been taking place since the Independence in 1957. Many of the problems and issues related to urban landscape resources are compressed within the study area. These are related to the decline in their condition and quality due to pressure for urban land use reorganization, advancement of building technology, changes in shopping styles and simple attitudes and the perception of significance of these resources.

Perhaps it is prudent to point out here that the area of the Lake Garden (Botanic Garden) is being left out of the study area. This has been done on purpose as the garden is already recognised by all concerned as an urban landscape resource and is getting more than its fair share of maintenance effort. The following chapter describes the study area and its landscape resources.

NOTES:

1.Laurie, M., (1975), **An Introduction to Landscape Architecture**, Elsevier, pp.2-3.

2.McHarg, I.(1969), **Design With Nature**, Doubleday, New York.

3.Quoted by Hendrix, W.G. (1977), **Regional Ecosystem Assessment: The Ecological Component of the Metropolitan Landscape Planning Model [METLAND]**, University of Massachusetts, Amherst. (Unpublished Ph.D Thesis), p.12

4.Ibid, p.12

5.Mumford, L. (1966), **The City in History: Its Origins, Its Transformations and Its Prospects**, Penguin, Harmondworth.

6.Op. cit., p.1

7.Smardon, R. (1975), Assessing Visual-Cultural Values of Inland - Wetlands in Massachusetts in Zube, Brush and Fabos (1975) (ed.), **Landscape Assessment**, Dowen Hutchinson and Ross Inc. Stroudburg, p.291

8.Kain, R. (1981), Introduction: definitions, attitutes and debates, in Kain, R. (1981) (ed.), **Planning for Conservation**, Mansell, London, p.11

9.Lowenthal, D. (1975) quoted by Howett, C. M. (1983), Landscape Research: Keeping Faith with Today and Tomorrow, in Austin et al. (eds.) (1983), **The Year Book of Landscape Architecture**, Van Nostrand Reinhold Co., New York, p.5

10.Ibid, p.5-6

11.Taylor, K. (1992), **Conservation and Interpretation Study of the Rural Heritage Landscape of the Lanyon-Lambrigg Area, Australia Capital Territory (ACT)**, an unpublished seminar paper given on a lecture tour at Edinburgh University, p.3-4

12.Lynch, K. (1972), **What Time is This Place?**, Cambridge, Massachusetts.

13.Emery, M. (1986), **Promoting Nature in Cities and Towns: A Practical Guide**, Croom Helm, London, p.19

14.Tartaglia-Kershaw, M. (1982), The Recreational and Aesthetic Significant of Urban Woodland, in **Landscape Research**, December, pp.22-25

15.Hanley, J. (1983), Nature in the Urban Environment, in Grove and Cresswell, (eds.)(1983), **City Landscape**, Butterworths, London, p.47-59

16.al-Quran; 30:41 (Translation by M.Pitckall).

17.It is obligatory upon a Muslim to say or insert the phrase "Peace be Upon Him" (p.b.u.h.) after the name of Mohammed, the last prophet of Islam, is mentioned or written.

18.Makkah or Makkah al-Mukarramah is normally refered to as "Mecca" in English. Madinah or Madinah al-Munarwarrah is normally referred to as "Medina".

19.Safak, A. (1980), Urbanism and Family Residence in Islamic Law, in **Ekistics**, No.280, Jan/Feb., p.23. One of the article of the agreement said:".......the conservation of the forest around Taif and prohibition of hunting wildlife within the area (forest). Those who disobeyed this regulation would be punished by lashing and confiscation of his properties".

20.In doing this the Prophet (p.b.u.h.) replaced the practice of keeping al-Hima as reserved grazing grounds for the tribal chiefs during pre-Islamic time with one that benefit the whole community.

21.Hanafi School is one of the four main theological schools of Sunni Muslims. The others are Shafie, Hambali and Maliki. Many scholars interpreted this as saying that an urban area should have, a clean environment (represented by the river), orderly urban activities (represented by the market-place) and a ruler who is responsible to ensure that both the first two qualities exist. It will be seen that of the three, the river is mentioned first and according to the methodology of Islamic interpretation, means that it is the most important element.

22.Safak, A. (1980), Ibid, p.22

23.Safak, A. (1980), Ibid, p.22. It might be helpful to note that the constitution of the Ottoman Empire was the last constitution that was based purely on Islamic laws.

24.Op. cit., p.197.

25.Hough, M. (1984), **City Form and Natural Process: Towards a New Urban Vernacular**, Croom Helm, London, p.5

26.Ibid, p.25

27. Steinitz, C. (1979), Defensible Processes for Regional Landscape Design, Landscape Architectural Technical Information Series, ASLA pp. 15

28.This is among the first recorded purposeful attempt to get the public involved and informed of the whole process of urban planning. It is again a credit to Manning to pioneer what is now an important element and procedure of urban planning.

29.In America, urban planning actually developed from landscape architecture (Laurie, 1975).In Britain, urban planning developed from the housing legislation in early 1900s, while landscape architecture from landscape gardening pioneered by men like Capability Brown, and Humphrey Repton.

30.Ibid, pp.17

31.GRID was actually an improvement of an earlier computer programme called SYMAP. Both these development took place at the Graduate School of Design, Harvard University.

32.Aronoff, S. (1989), **Geographic Information Systems: A Management Perspective**, WDL Publications, Ottowa, p.39.

33.**Attap** is a Malay word for thatched roof made from the fronds of Nipah palm (**Nypa fructans**).

34."Kaki lima" is the Chinese corruption of a Malay phrase, "lima kaki" which can be literally translated as "five feet" - a reference to the width of the covered way. This in turn had been incorporated into the English language as "five-foot way".

35.British rule in the region in 1800s could be divided into three categories. The direct rule was in the Strait Settlements (Penang, Malacca and Singapore). This was headed by a Governor-General. The Federated Malay States were made up of those Malay States (Selangor, Pahang, Perak, and Negeri Sembilan) where there was direct intervention in the daily affairs of the states by British executive titled as Residents. The chief British executive in these states was titled the Resident-General. The next category was called the Non-Federated Malay States (Johor, Terengganu, Kedah and Kelantan). These states were separate entities with British advisors. Even though only in the first category the rule could be term as full-pledge colonization, there was actually a fiction of Malay rule in the other two. After the Second World War, the country was briefly ruled as a single entity called the Malayan Union. This was abandoned after very strong opposition from the Malays, who wanted the sovereignity to stay with the respective Sultans. A federation of 11 states was then formed and named the Federation of Malay States (commonly called Malaya). When Singapore and the British colonies of Sarawak and North Borneo joined the federation, the name was changed to the Federation of Malaysia.

36.Lim, H.K., (1978) **The Evolution of the Urban System in Malaya**, Penerbit Universiti Malaya, Kuala Lumpur, p.73.

37.This regulation had been included into the National Land Code which is the supreme law regarding land administration in the country.

38.The Local Government Act, 1976 (Act 171) divides the country into three types of local administrations: the "city councils" for large metropolitan areas (such as Kuala Lumpur, Ipoh), the "municipal councils" for smaller urban centres (such as Seremban, Alor Star, Kota Bharu, etc.) and lastly the "district councils" for the generally rural districts. The Town and Country Planning Act, 1976 (Act 172) requires that every one of these local authorities draw up a "structure plan" for the areas under their respective jurisdiction.

39.Between 1982 to 1986, almost every major towns in the Peninsula Malaysia had a team conducting a structure plan study. These were carried out either in-house by the Federal Town and Country Planning Department or by urban planning consultants. Among these towns were Kuala Terengganu (Terengganu), Kuantan (Pahang), Seremban (Negeri Sembilan), Kota Bharu (Kelantan), Johor Bahru (State of Johore). These activities are now slowing down.

40.Following the setting of the tin mines surrounding it, 3 sundry shops were set up by the Chinese settlers to cater for the needs of the miners. One of the shop-keepers, Hiu Siew was appointed the first headman. See Lim, H.K. (1978), **The Evolution of the Urban System in Malaya**, Penerbit Universiti Malaya, Kuala Lumpur, p.80

41.Zen, I.H., (1982), **Reclamation of Former Tin Mining Land in Malaysia**, M. Phil in Landscape Architecure Thesis (Unpublished), University of Edinburgh, pp. 54 and 110

42.Teh, T.S. (1989), An Inventory of Green Space in the Federal Territory of Kuala Lumpur, in the **Malaysian Journal of Tropical Geography**, Vol. 20, December, p.61

43.Dewan Bandaraya Kuala Lumpur, (1984), **Kuala Lumpur Structure Plan**, p.181. In 1979, the Sultan of Selangor was quoted by the local press calling for the replacement of the shophouses in the royal town of Kelang with sky-scrappers for basically the same reasons.

44.Formerly known as the Beautification Unit.

45.The Landscape Design and Parks Department of the City Hall of Kuala Lumpur is currently in-charge of designing and implementing landscape beautification schemes for areas such as open spaces, green spaces, and housing areas in the city. Its urban forestry sub-unit is in-charge of maintainance of all the street-side trees within the Federal Territory of Kuala Lumpur. Lately, its role has expanded into advising the Urban Planning Department on matters pertaining to landscape when a planning application is considered.

46.This development has been obvious from the first days of the rise to power of the present prime minister, Dr. Mahathir Muhammad, in 1984. His interest in a beautiful and clean urban environment has reached almost crusading pitch and has transformed within less then five years the image of the capital city from a filthy city to one of the cleanest and most green in South-east Asia. His professional training as a medical doctor must be the main reason for his acute awareness of the importance of a clean, beautiful and orderly environment to the development of a healthy nation. Thus one can understand his irritation at the international environmentalists' condemnation of Malaysia's stand on environmental issues.

47.The present rate of exchange is 1 Sterling pound to M$3.90. It should also be pointed out that when the hidden budget, such as expenditures for the beautification work for festivals and other major events, and landscape was work being carried out by other government agencies, such as the Public Work Department are taken into consideration, this figure is easily trebled.

48.Hussin, A. (1989), **The Role of City Hall in Improving the Quality of Urban Green in Kuala Lumpur**, a paper presented at Seminar for Urban Green at the Institute of Advance Studies, University of Malaya, 7-9 August, 1989, p. 6

49.Malaysian Tourism Development Board, 1991.

50.Yakub, A.B. (1992), **The Application of Geographical Information Systems for Urban Planning and Management: A Case Study of Squatter Settlement Planning in Kuala Lumpur, Malaysia**, Phd. Thesis, (Unpublished), University of Edinburgh, p. 6

51.Selangor is one of the 13 states that made up the Federation of Malaysia. Prior to 1974, Kuala Lumpur doubled up as the National Capital as well as the state capital of Selangor. Most of the soil studies done on Kuala Lumpur were therefore carried out by the state's agriculture department.

52.The street names in brackets are old names for the street during colonial days. Those that are without old names are either roads constructed after independence or where old indigenous names are being kept (See also Appendix 4).

53.The term "interior" was used to differentiate between urban centres created in the interior of the peninsula as against the the traditional riverine centres founded before the intensive exploitation of the hinterland. Even though most initially relied on rivers to transport their export and import, most of the interior towns were later connected by railway systems. Advent of the railways brought about the decline of traditional riverine centres except for those with good harbours and railway connections.

CHAPTER 2

THE MAKING OF KUALA LUMPUR OLD TOWN AND ITS URBAN LANDSCAPE RESOURCES

> "....... there exists at the back of our minds a feeling that could we only start again we could be rid of this hotchpotch and make all new and fine and perfect. We could create an orderly scene with straight roads and with buildings that conformed in height and style. Given free hand that we might do ..... create symmetry, balance, perfection and conformity. After all, that is the popular conception of the purpose of town planning"
>
> (Gordon Cullen, 1971)[1]

INTRODUCTION

The incidence, character and volume of landscape resources are very much determined by the layering of history over the natural setting of an area. The same is equally true for both town and country. Writing an introduction for the 1985 yearbook of Landscape Architecture, Melnick, R.Z. (1985) wrote: "The history of a people is drawn on the face of the land, across the landscape. As we settle, control, use, alter, and manipulate the land, we change it and mark it as ours. Once settled, land is never the same and the wilderness disappears. Subsequent generations and users add their signatures, and layers of human input build upon the landscape".[2] Recognising this phenomenum two decades earlier, Lewis, P.H. (1965) coined the term "cultural corridor". Melnick (1983) expanded the term to "cultural landscape" to mean any landscape that exhibited significant human input.[3] In recent years the term "historic cultural landscape" was coined to emphasize the historical significance of a landscape (Taylor, K., 1992).[4] The ability of man to affect changes to nature was graphically illustrated by Gutkind (1952) (Chapter 1). However, in search of unique ways to control the land, new methods and styles to suit his needs, "man seem to lose pieces of the quilt of the past, pieces of his heritage" (Melnick, 1983).[5]

This chapter outlines the making of the morphology of the urban landscape of Kuala Lumpur. It emphasizes its proto-typical nature vis-a-vis other urban settlements in the Malay Peninsula. The evolutionary growth of the city, although in most cases detrimental to the quality and quantity of its urban natural landscape resources, has left extremely valuable pockets of such resources. Enveloping these pockets of nature, are buildings and spaces that are important in determining the character of Malaysian urban areas, making themselves integral in the definition of urban landscape. We will examine the shrinking of these resources to their present states in order to suggest improvements to incorporate the concern for their conservation within the traditional Malaysian urban planning system.

AN OUTLINE OF THE HISTORICAL DEVELOPMENT OF AN URBAN SYSTEM IN THE MALAY PENINSULA

The Malay Peninsula was called **Aurea Chersonese** by the great Greek geographer, Ptolemy.[6] Whether the name literally meant that the peninsula was rich in the shining metal or not at the time was quite difficult to determine. Most historians believed that the name was more of an allusion to its importance in the stage of inter-continental trade flourishing since Antiquity. Its strategic position which Meilink-Roelofsz (1962) described as "destined from time immemorial to play an important role as a transition area for products of East and West, and a meeting ground for merchants coming from all directions" was mainly responsible for this importance (Appendix 12).[7]

Its active role in international trade did not result in the development of an urban system. This is because despite the relative narrowness of the peninsula, movements of people were severely restricted by the alignment of the mountain ranges and by the deneness of one of the oldest tropical rainforests in the world.[8] Human activities were confined to the narrow coastal strips and riverine lands. Even here the developments were further restricted by the patchy existence of fertile soil. The seasonal north-east monsoon also limited the cultivation periods in the east coast while the existence of extensive marshes was the limiting factor along the west coast (Fig. 2.1). Fisher, (1966) observed that "the physique of Malaya has been in no sense exceptionally favourable to human settlement".[9]

Consequently, to paraphrase Fisher, C.A. (1966) the peninsula was an area of demographic immaturity, with only a few regions being densely populated.[10] Populations then were scattered in a relatively few favoured lowland areas on the edges of the peninsula. The restriction in term of people movement resulted in a fragmented political structure. Ptolemy mentioned Takola, Sabana, Kole and Palanda. There is no agreement as to the exact locations of these settlements but the first two were described as trading ports and the last two as towns (Linehan, 1951).[11] Central powers were never able to lay more than nominal claim to suzerainity over the whole of the peninsula. Consequently, since the time when the Malays first populated the peninsula in the 3rd Century A.D. until the founding of the Malacca Empire by Parameswara in 1403, only a common language and culture provided any semblance of nationhood.[12]

In pre-colonial times then, there were urban centres spread along the coast of the Malay Peninsula, but these were semi-autonomous if not independent, and did not provide the kind of hierarchy which could have sustained a large city. The inhabitants were always at war with each other. Regional pre-colonial imperial powers like the Sumatra-based Sri Vijaya Empire, the Java-based Majapahit

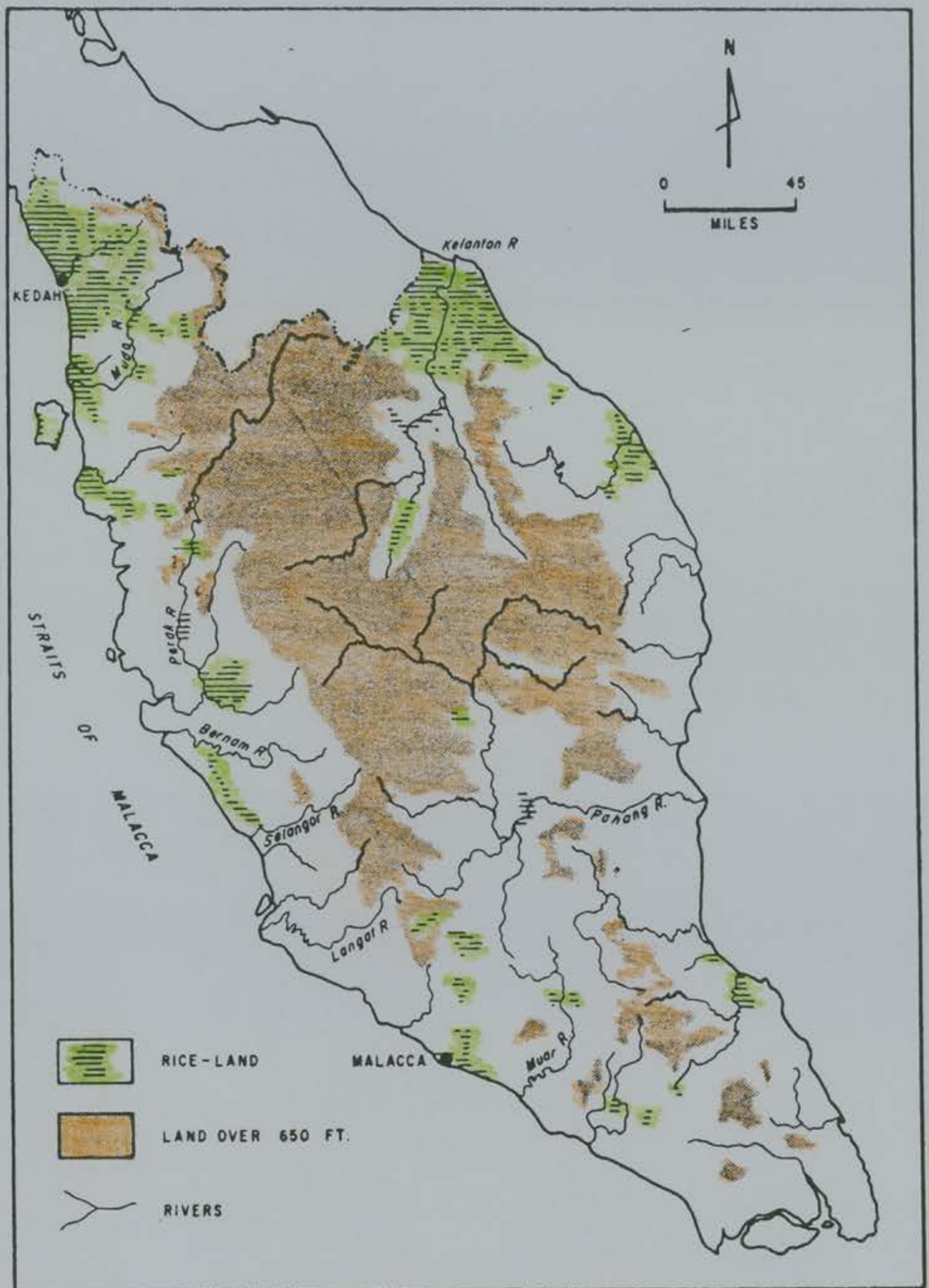


Fig. 2.1: <u>**Physical Limits to the Development of an Urban System in the Malay Peninsula (pre-1880s)**</u>: Two natural constraints of the development of settlements and cultivation were the Titiwangsa Range (formerly known as the Main Range), that ran roughly through the middle of the peninsula, and the riverine swamps. Areas with rice cultivation indicated relative permanent settlements. Note the locations of Malacca and Kedah. (Source: Lim, H.K., 1978, p.6)

Empire, and the Siam-based Ayothia Empire ruled only different parts of the peninsula and at different periods. This situation persisted during the early years of European colonization. The Portuguese, the first European power to set foot in the area when they captured Malacca in 1511, were not able to extend their rule over the rest of the country and were boxed in a little territory along the small Malacca River. So were the Dutch when they captured the city from the Portuguese in 1641. However, the arrival of the British in 1786 marked a change.[13] By then the Malay Peninsula was attractive not only because of its strategic riverine ports that could control the inter-continental commmerce, but it now had local resources such as tin and gambier that were in great demand in the Western markets. The British knew well enough how to keep power by playing one local ruler off against another. Safe in the knowledge that there was no likely strong local combination against them, they set about vigorously developing and exploiting the resources of the hinterland, taking particularly tin, and later on rubber by river and later by railway (Cooper, 1984).[14] With this exploitation there sprang up a distinctive pattern of settlements reflecting a bureaucracy needing control from the centre (Fig. 1.1).

The development of urban centres in the country was therefore, largely the result of the above phenomena - a colonial legacy (Lim, 1978).[15] Kuala Lumpur, the capital of Malaysia, has inherited a colonial urban form quite similar to those in other countries that have been under British rule. However, the twin policies of conscious exclusion of the native population from the colonial economy and instead, the use of mass immigration of aliens to provide manpower and later investment to work that economy resulted in an urban form with a "quite unique morphology and character" (Roff, 1967, Kohl, 1984).[16] There has been much debate recently as to the future of the Malaysian urban image derived from this era; whether it should it be conserved as a relevant relic of the past, or expunged. The city centre owes much of its present character partly to its colonial past and partly to the immigration policy of that past.[17] This chapter explores the character of this morphology and discusses its value as a cultural resource in the future planning of the city.

KUALA LUMPUR: EVOLUTION AND MORPHOLOGY OF A COLONIAL URBAN FORM.

When the British arrived on the scene in the early 1800s, small scale mining activities were already taking place in the area immediately surrounding the present day Kuala Lumpur. Chinese miners were actively mining in areas in Kanching and Lukut, which were within the Selangor River system (Appendix 3).[18] At the same time Malay miners, led by Raja Abdullah and Raja Jumaat, the sons of Sultan Mohammed, Selangor's third Sultan, were also mining in the Ampang area, about four miles to the north-east and within the watershed of the Kelang River. In 1857, eighty-seven Chinese miners from the nearby Kanching mining fields poled up the Kelang River and disembarked at a point where it branched into its main tributory, the Gombak River. This was an ideal place for the miners to set up camp as there was an existing Malay settlement on the confluence of the river from where they could get food as well as protection from the local headman acting on behalf of the Sultan.[19] The village was probably called Sungei Lumpur.[20] It was also the farthest point up-river that a boat of reasonable size could go. When tin was found in abundance in the area around Ampang and the adjoining Batu area, the miners decided to stay. The news of the richness of the mines brought a flood of mainly Chinese fortune-seekers from the Strait Settlements and mainland China under the indented labour scheme popular during that time.

The temporary camp set up by the miners on the eastern bank of the river, just below the Malay settlement grew into a mining post, known as "Pengkalan Lumpur", but was popularly known among the Chinese miners as "Lorong Pudu" (Lim, 1978). It was very much the eastern version of an American Wild West trading post, except that the metal was not the glittering gold or silver but the lack-lustre ores of tin called cassarites. It started with just three shops mostly selling provisions for the miners at exorbitant prices. The name "Kuala Lumpur" was not used officially or by the Chinese until after 1880 (Lim, 1978). This change of name reflected the progress the town had made to a full-pledged commercial centre after that date.[21]

During the next two decades the colonial-immigrant forces combined to transform the mining town of Kuala Lumpur into a booming commercial centre. In 1880, Bloomfield Douglas, the second British resident in the court of Sultan Abdul Samad, transfered the state capital, lock stock and barrel, from the declining Kelang to Kuala Lumpur, thus further enhancing its importance. The British managed to persuade the rulers of four Malay states (where their "advisers" had been upgraded to "residents") to form a loose federation called The Federated Malay States. In 1896, Kuala Lumpur became the obvious choice as the capital of the new federation of British protectorates.[22] This move not only doubled the role of Kuala Lumpur, but it also bestowed on it the highest position in the hierarchy of towns in the Malay Peninsula at that time.

Inspite of initial obstacles, the state of Selangor proved to be suitable as a locale for the development of a national capital. Its location at the apex of the newly created urban hierachy stimulated a very rapid expansion of the town. Lim (1978) observed: "The forces of the colonial-immigrant complex, which stimulated the development of modern towns and indeed the entire (Malayan) urban system, were at their strongest in creating the national capital on the mainland. The characteristics of the urban process centred on the capital city were typical. The traditional coastal settlements were replaced by the interior immigrant mining centres, which in turn were taken over by the colonial power and accorded new administrative functions. The joint forces of the colonial-immigrant complex not only broadened the economic and functional bases of these centres, but linked them with other interior centres and coastal ports by the newly constructed transportation networks. The evolution of the urban system was thus set in rapid motion".[23]

Although Kuala Lumpur had a cosmopolitan character, it actually grew into a town with three distinct zones divided along ethnic lines (Appendix 13). The mainly British, European population set themselves up on the Damansara Hills, on the western part of the town where the topography could be described as rolling low hills which they fashioned into a garden-city of their own (Fig. 2.2). The buildings were mostly bungalows and colonial mansions spaced thinly within the hillocks.

The construction of the 173 acre Kuala Lumpur Botanic Garden in 1888, on the initiative of Alfred Venning, the first chairman of Kuala Lumpur Sanitary Board, enabled new areas to be opened up for residential buildings.[24] Although located close to the town centre, the area then was still "running wild with pig, deer and occasional tiger and occupied by a handful of Chinese squatters" (Tate, 1984).[25] Venning's design involved damming a small stream called Sungai Bras Bras into an artificial lake, initially called "Lake Sydney" after the Resident-General's wife.[26] A parkland, designed very much in the fashion of an English landscape was created by replacing the Screw Pines (<u>Pandanus sp</u>.), Lalang (<u>Imperata cylindrica</u>), and tree ferns with flowering trees, shrubs and clean-cut Cow Grass (<u>Axonopus compressus</u>). It was officially opened by Sir Cecil Clementi, the Governor of the Straits Settlements in May, 1889.[27] On occasions the Gardens were put to official use, as was the case in 1903 when a temporary conference

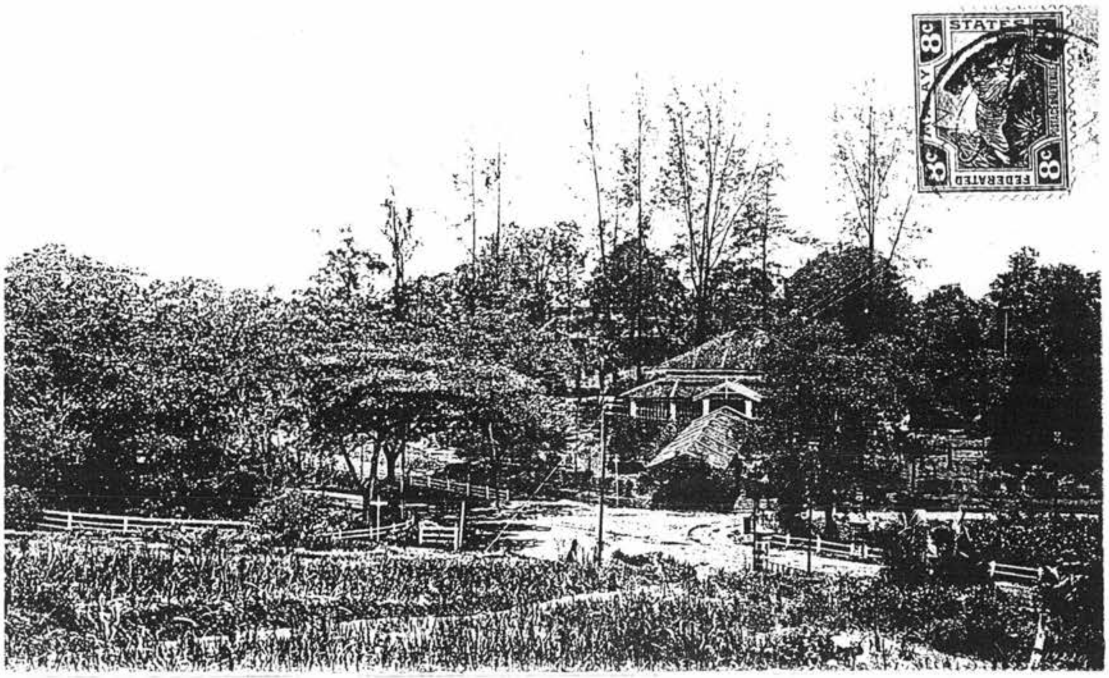


Fig. 2.2: <u>Damanasara Hills</u>: British expatriates developed the rolling hills of Damansara in a garden city of their own. The lush surrounding of tropical rainforest gave the area a surreal look.
(Source: Tate, M.D.J., 1987)

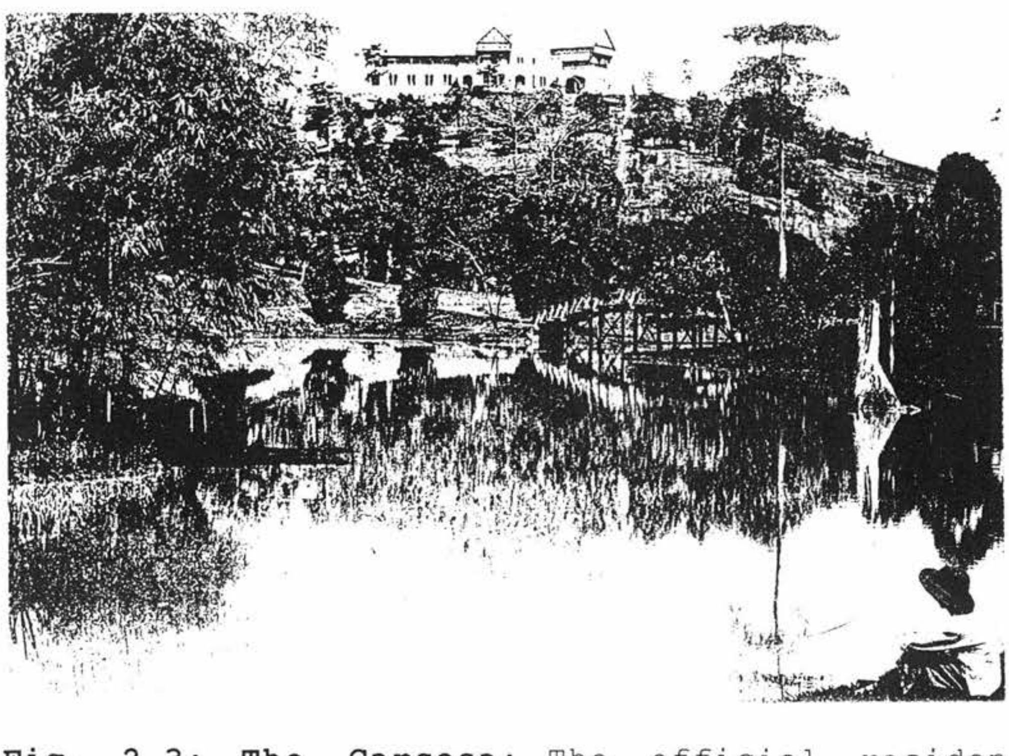


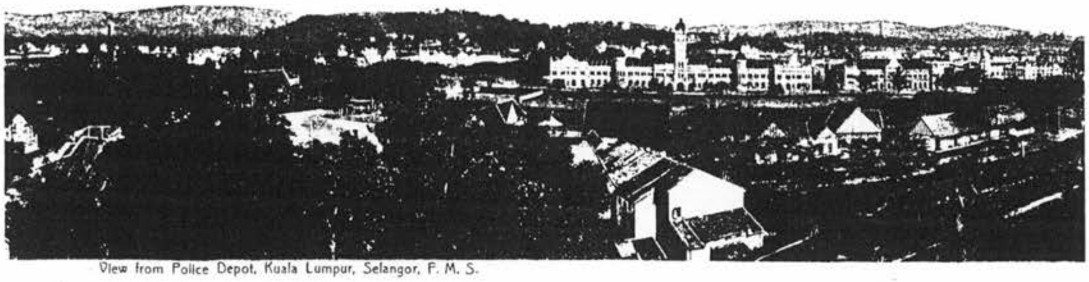
Fig. 2.3: <u>The Carcosa</u>: The official residence of the Resident-General, built on the order of Sir Frank Swettenham. It gave further prestige to the Damansara Hills as a place of residence for the expatriates.
(Source: Tate, M.D.J., 1987)

hall of bamboo and attap was erected to house the Second Durbar of the four rulers of the Federated Malay States and their "British residents".[28]

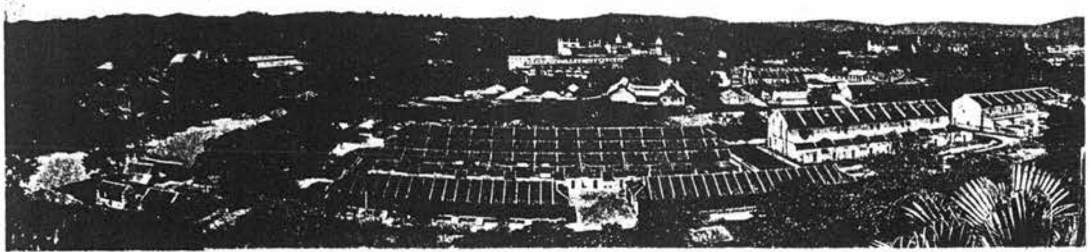
When "Carcosa", the official residence of the Resident-General of the Federated Malay States was built on the order of Sir Frank Swettenham in 1896, on a hill overlooking the artificial lakes of the garden, the area assumed further prestige as a prime residential location sought after by all the European population of the city (Fig. 2.3).[29] The residents transformed the area into well-maintained shrubbed gardens with manicured lawns, giving it a surreal look amidst the surrounding dense tropical jungle.

The Chinese, who by then were content with purely economic pursuits, mainly populated the town centre that had developed on the eastern bank of the river up to the low hills of Ampang and Pudu (Petaling Hills).[30] The commercial centre of Kuala Lumpur was their domain. From here sacks of tin ore were loaded into river barges to be sent downstream to Kelang from where provisions were transported upstream. The provisions were then either transported directly to the the mines or traded at Kuala Lumpur. The mine owners responsible for bringing in the mine workers built rows of single storey attap longhouses fashioned very much like village houses in their native Southern China. This fact, more than anything else, fashioned the urban image of Kuala Lumpur into a distinctly Chinese settlement. The rows were built back to back with each row of up to twenty units divided by party walls. Because they were long rows and approximately parallel to the river, they developed a distinctive urban fabric of almost regular streets (Fig. 2.4 and Fig. 2.4A).

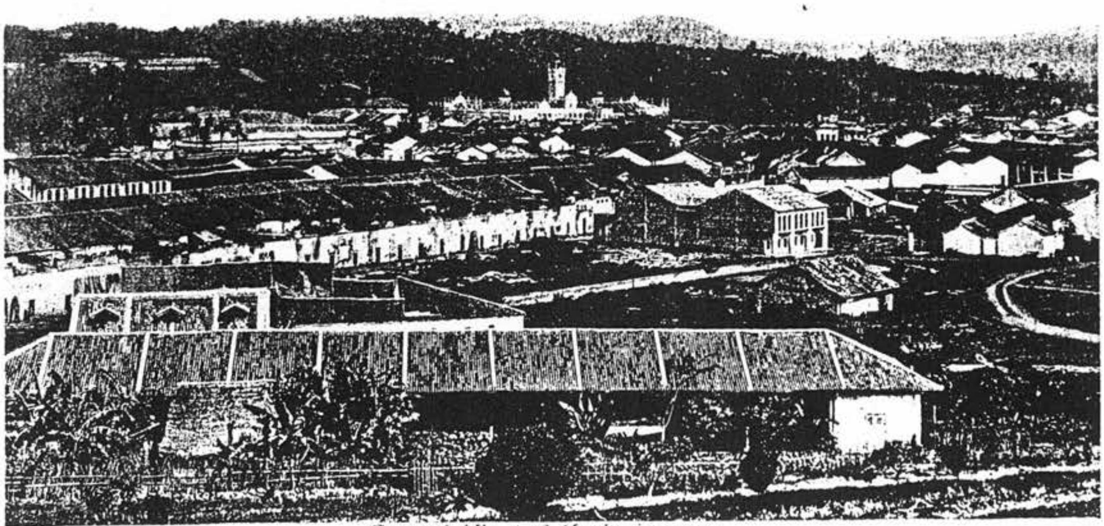
The Chinese community also developed the commercial life of the town, first by opening general stores to serve the daily needs of mine workers, then by creating an intensively built-up commercial centre. When Yap Ah Loy,



View from Police Depot, Kuala Lumpur, Selangor, F. M. S.



- View from Petaling Hill, Kuala Lumpur, Selangor, F. M. S.

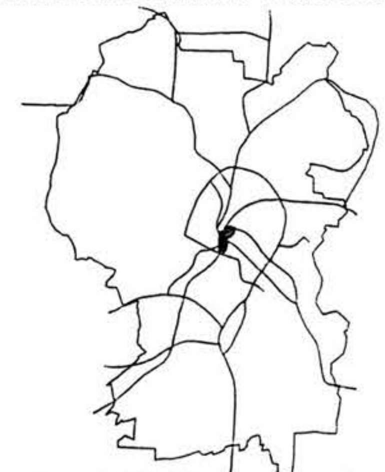


General View of Kuala Lumpur.

Fig. 2.4: **Regular Rows of Colonial Shophouses** defined the distinctive character of Kuala Lumpur Old Town. The clock-tower of the State Secretariat in the distance provided an enduring landmark. Note the Damansara Hills in the background which contained the town on the western bank of River Kelang. Note also the original course of the river. These pictures were taken at about 1890s when the order to rebuild the shophouses in bricks and fired-clay tiles were given.
(Source: Tate, M.D.J., 1987)

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



FEDERAL TERRITORY OF KUALA LUMPUR
LOCATION OF THE STUDY AREA

STREETS AND IMPORTANT HISTORICAL BUILDINGS

FIGURE NO: 2.4A

LEGEND

1 SELANGOR CLUB
2 GOVERNMENT PRINTING PRESS
3 FORMER CHARTERED BANK
4 WATER BOARD
5 OLD GENERAL POST OFFICE
6 STATE SECRETARIAT
7 OLD TOWN HALL
8 HIGH COURT
9 SURVEY DEPARTMENT
10 COLESIUM THEATRE
11 CENTRAL MARKET
12 FORMER V.I.
13 LEE RUBBER BUILDING
14 TRAFFIC POLICE HQ
15 BPR BUILDING
16 HIGH ST. POLICE HQ
17 SRI MAHARIAMAN TEMPLE
18 CHINESE TEMPLE
19 ST. JOHNS INSTITUTION'
20 BUKIT NENAS CONVENT
21 AIA BUILDING
22 CHURCH OF ST. JOHN
23 TALIKOM MALAYSIA HQ.
24 CHURCH OF ST. MARY
25 JAME MOSQUE

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: STHB.AML

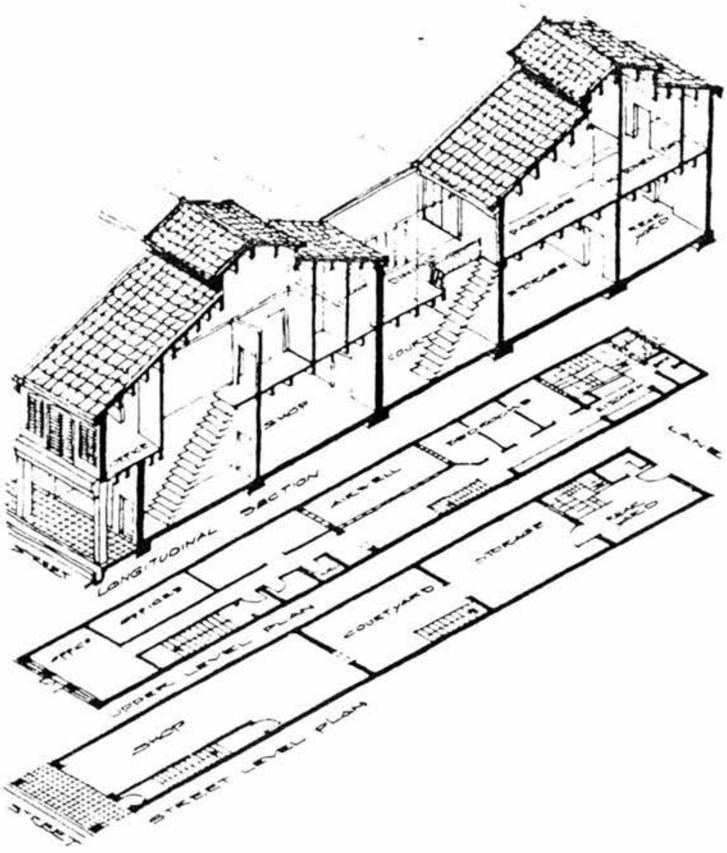
the Capitan China, built himself a large townhouse, and opened a wet market and a gambling shed, on the eastern bank a few hundred yards from the confluence of the river in 1868, the seeds of a commercial centre were firmly sown.[31]

The richness of the mines meant that the miners quickly grew wealthy. Gradually a community of merchants moved in to provide consumer services for the rapidly growing population. They built structures which not only housed their shops and their living spaces but also spare rooms for renting either for short-term or long-term. Many were built by Chinese towkays who got the concessions for tin mining for their indented workers. This was a very convenient way of living as most of the Chinese immigrant miners were males. Arrangements therefore could be made for shared cooking or kitchens. However almost all the original houses were virtually destroyed at the height of Selangor Civil War (1866-74) when rival gangs of Chinese joined in the fray.[32] Yap Ah Loy, one of the eventual winners, rebuilt the town in much the same way as it was. However, fires and floods frequently destroyed parts of the settlement. The big fire of 1881 followed by a similarly devastating big flood the following year, convinced the British administration at that time that something drastic must be done to check this constant threat to public safety and the permanence of the new capital.

Sir Frank Swettenham, the British Resident-General of the Federated Malay States during these events ordered the reconstruction of the Chinese section of the town, street by street. The rebuilding and the introduction of the new regulations together marked the beginning of urban planning in Selangor and Kuala Lumpur although town planning proper was not began until 40 years later with the posting of Charles Reade as the first British town planning officer in the country in 1921 (Muhammad, 1993).[33]

Apart from recommending the use of brick and fire-proof ceilings, the government was urged to widen and extend the streets and to divide the town into four different quarters: the first was for "large traders and large shopkeepers", the second was for "blacksmiths and other hazardous traders", the third was "to house brothels" and the last was for "opium shops, cooking shops and confectioners shops" (Jackson, 1963).[34] From 1882 onwards the streets of the town centre took shape. They were laid out in conformity with the official regulations regarding their width, drainage and access back alleys. A start was made with the Market Street, then Ampang Street, High Street and Pudoh Street (Appendix 4). In 1884, there were 45 brick shophouses in Kuala Lumpur, the following year 218. By 1887, there were 518 brick shophouses and by 1889, it was possible to order the demolition of all the remaining wooden and thatch-roofed buildings. By mid-1886, the "dirtiest and most disreputable looking" place had as a result "quite changed its character", and was "fast becoming the neatest and prettiest Chinese and Malay town in the Colony" (Jackson, 1963).[35] Gullick (1955) observed "the streets have been widened, metalled and drained, and rows of sufficiently regular, yet picturesque houses and shops brightly painted and often ornamented with gilding form the streets!".[36] The streets were constructed in regular fashion to facilitate drainage and fire fighting. There was a compulsory break of some 3 metres wide between abutting rows. To facilitate sanitary work, it was made compulsory for the rows of shophouses to face back to back onto a backlane of about 3 metres wide. The new shophouses adhered to the same basic pattern already familiar in the Strait Settlements and to become the stereotype for all the towns in the Malay Peninsula (Fig. 2.5).

Originally the shophouses were single-storey structures commonly known as Early Shophouse Style of which only a few examples survived to this day (Appendix 5). When



Typical Floor Plan and Design of a Colonial Shophouse of Kuala Lumpur Old Town.

Typical Street Elevation of Kuala Lumpur Old Town showing the development of the Colonial Shophouses from single to two or three storey buildings.

Fig. 2.5: Typical Colonial Shophouses of Kuala Lumpur Old Town.
(Source: Gurstein, P., 1984)

vehicular traffic (though not necessarily motorised) increased in volume and the conflicts with pedestrians also increased, Kuala Lumpur Sanitary Board decreed that every shophouse should have a five-foot way.[37] This was not only to keep pedestrians away from the road but also protect them from the elements of the tropical climate. Thus the five-foot way was added to the simple architecture of the shophouses. The ingenious shophouse architects designed rooms with folding openings above these walkways to enable the inhabitants living in the upper floors, to check the identity of late-night callers or to enable the goods to be transported directly to upper floor storage without having to go through the main shopping floor (ground floor).

In spite of its rapid development in the 1880s, Kuala Lumpur was still a "small town", or perhaps no more than "a larger village", as were other centres in the interior.[38] It was not until the 1890s, especially after the administrative function of the highest order - the capital of the newly created Federated Malay States - was added to it in 1896, that Kuala Lumpur became distinguished "from other growing mining centres elsewhere in Malaya, such as Ipoh (Perak), Taiping (Perak) or Seremban (Negeri Sembilan)".[39] As Kuala Lumpur grew in importance and prosperity, the single-storey block gave way to two and three-storey buildings. Between 1900 and 1930 colonial shophouse architecture reached its zenith. Elaborate neo-classical or neo-baroque columns, friezes and cornices were added to exteriors while at the same time hiding more simple and traditional interiors (Fig. 2.6).

Within the complex of streets the Chinese of Kuala Lumpur lived and laboured, carrying on with their business and commerce. They divided themselves according to dialectic groups and clans, each concentrating in a particular part of the old town. This seemed to have been a very logical arrangement both for security in an often hostile, and competitive environment during the early days

Fig. 2.6: <u>Rich Details of the Exteriors</u>: they hide the simple interiors of the Colonial shophouses.

and also to benefit from mutual solace and the companionship afforded by common social background and roots - providing their own amusements and looking after their kith and kin through their traditional clan organizations and kongsi halls.[40] They built their own hospitals, founded and maintained their own schools, and spent a generous share of their surplus wealth on building ornate temples in support of their traditional cults.[41] It was in the construction of these buildings that the genius of the Chinese craftmen - designers, sculptors, painters, wood engravers, interior decorators - the magnificence of traditional Chinese architecture were seen at their fullest. One of the most remarkable was the Chan See Shu Yuen, located at the foot of a small hill at the end of Petaling Street - then southern-most limit of the town - standing like a sentinel guarding the town against the evils that might emanate from the jungle beyond (Fig. 2.7). The Ka Yin Hooi Kuan, the kongsi of the Hakka community located at Sultan Street was another fine example (Fig. 2.7).

In the 1930s rubber became an important cash crop and the railway replaced the river as the major mode of transportation. Lured by promise of good wages and better living condition, thousands of Indian (mainly South Indian) indented workers were brought in by the mainly British European planters and contractors to work in the rubber estates, road and railway construction.[42] In Kuala Lumpur, many of them settled in the Brickfields and Sentul areas. Brickfields which is situated just to the south of the town centre, took its name from the brick-making industry that was to develop there. Because most of the travelling to and from work-places was done on foot, the department built labour lines within the working site for the convenience of the workers. The growth of Sentul was more directly related to the railway as it was the locations for the godowns and storage facilities for rubber and tin that were eventually

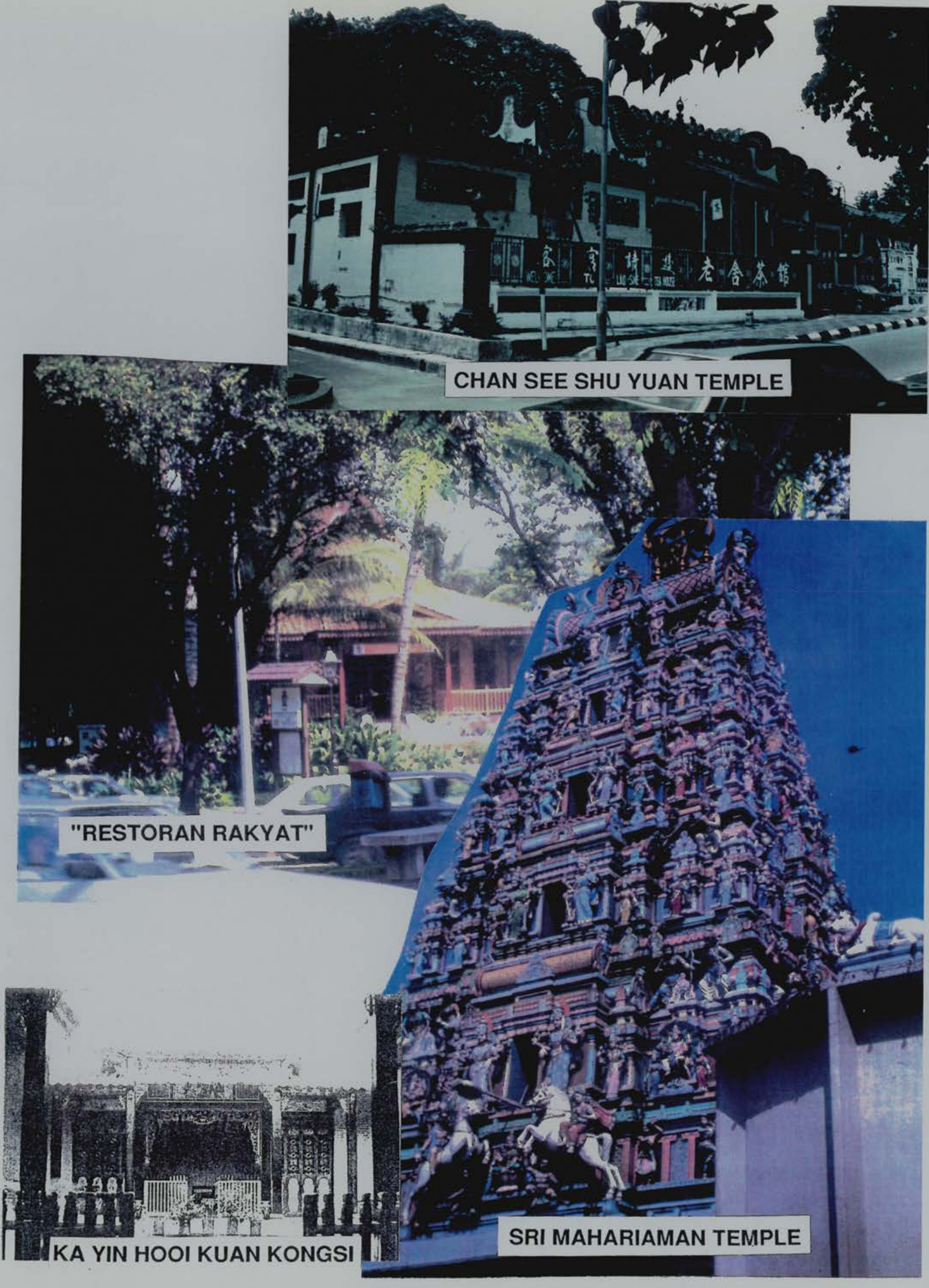


Fig.2.7: **<u>Historical Buildings</u>:** Religous and Community Halls

transported by rail to Port Swettenham (now Port Kelang) at the mouth of River Kelang. Some Indians were successful and eventually replaced the Chinese in the Market Square and Batu Road (Tuanku Abdul Rahman Road) area where they ran lucrative money lending and wholesale businesses. Like the Chinese before them, they also built their temple, the Sri Mahariamman, within their area adding colour and gaiety to the already diverse urban environment.[43]

It was the practice of the day that the Malays did not live side by side with the immigrant population whom they despised as infidels and ill-mannered. However, unable to hold the tide of immigration of the Chinese miners and merchants, they regrouped themselves into villages on the west bank of the Kelang River, at a point where it branched into a small tributary called the River Bunus. Raja Jumaat, their district chief, founded a settlement which until the present day does not have any proper name other than that it is a "new village" (kampong bahru).[44] The Malays also relocated themselves along the Gombak River where it set into the low hills at the foot of the Main Range (Kampong Gombak) and along the Batu tributary (Kampong Batu). In these areas the Malays were basically left to carry on with their traditional way of life; farming the swamp for rice and growing fruits in between their single storey detached attap houses. It was a deliberate colonial policy then that the Malays were to be left alone for the fear that a commercial way of life would create chaos and greed in this gentle and economically ignorant society.[45] Only the Jame' Mosque built on a former Muslim burial area to replace the original one on the eastern bank stood as the symbol of the now vanished original Malay settlement on the famous muddy confluence which probably gave its name to the city. This beautiful and most graceful mosque designed in the fashion of north Indian style was the work of A.R. Hubbuck, the Public Works Department's architect. Steps were designed to reach the water level of the river (Fig. 2.8). Perhaps this

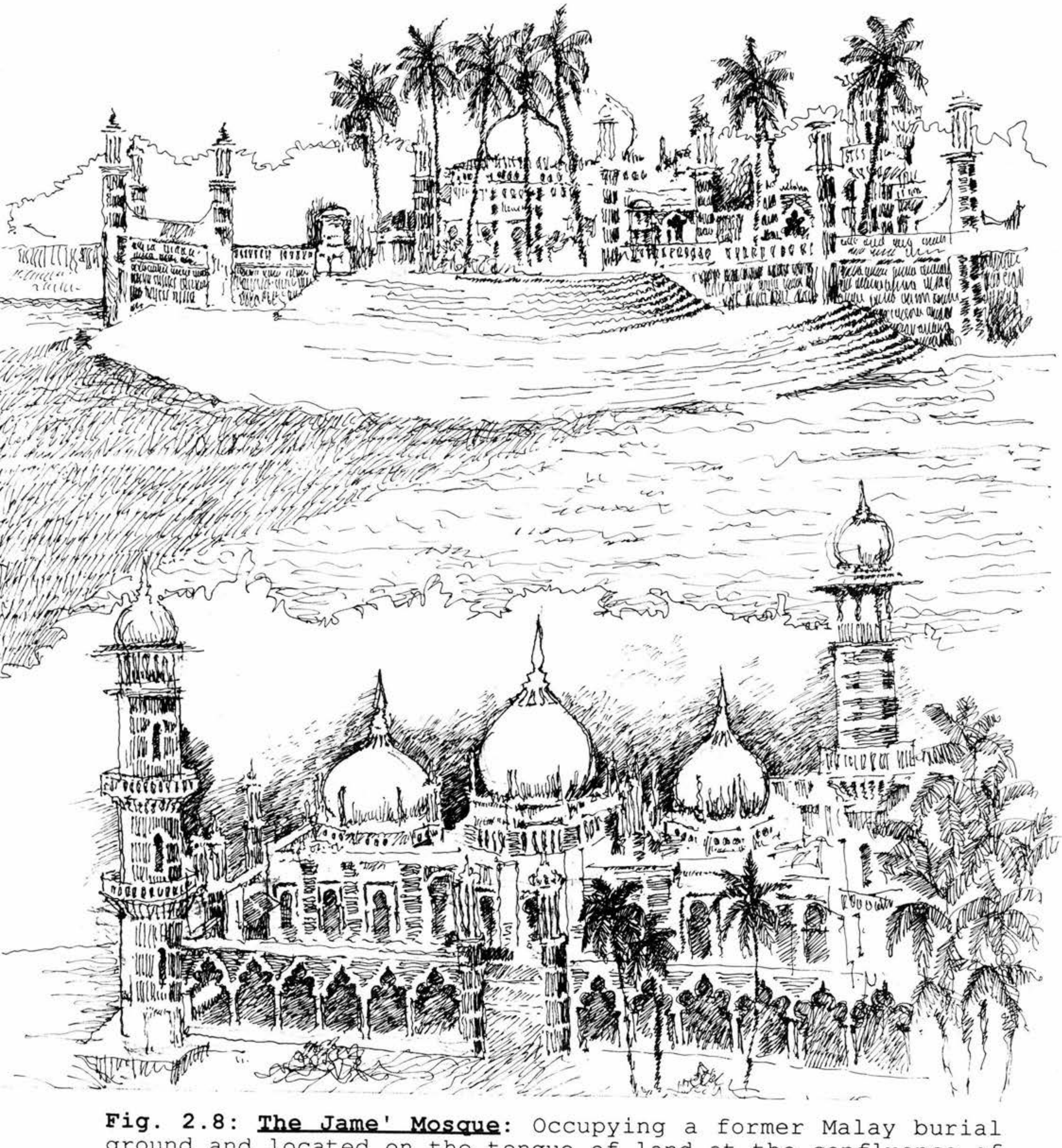


Fig. 2.8: <u>The Jame' Mosque</u>: Occupying a former Malay burial ground and located on the tongue of land at the confluence of River Kelang and River Gombak, the mosque is an enduring testimony to the presence of a Malay village (probably known as Sungai Lumpur) on the site that predated the present Kuala Lumpur.
(Source: Tate, M.D.J., 1987 and H.K. Lim, 1978)

was deliberate in an effort to accomodate the habitual liking of the Malays to make their ablution directly from the river. The steps were demolished in the 1960s during a bank-reconstruction work. By then they were also functionally redundant as ablution from the river was made impossible because of its highly polluted state.

Within the town centre, there was not very much land left for civic areas. However on the western bank of the river, civic buildings were constructed by the colonial administration. Together with the Jame' Mosque, they formed the civic core of the town. Most of these buildings were fronting the parade ground or the "Padang" (Fig. 2.9). The parade ground was created by draining a swamp at the foot of a group of small hills called the Bluff.[46] Foremost among these was the majestic State Secretariat Building (now known the Sultan Abdul Samad Building) which was built in the Moorish architectural style in 1894 (Fig. 2.10).[47] Its tall and impressive clock tower was to become one of the most prominent landmarks in the town for many years to come. Built only a short distance to the north and in a similar architectural style was the Kuala Lumpur Sanitary Board. The General Post Office which was the third civic building built was sited on the south of the former, creating an impressive trio. The Water Board, the Supreme Court and the Survey Department completed the eastern edge of the Padang.[48]

Being a devoted and strict Christian, Swettenham ordered the building of the Anglican Church of St. Mary the Virgin on the northern side of the ground. An early expatriate remembered that one was compelled to give a very good excuse if the Resident-General noticed that one was absent during any of the Sunday services conducted in this church (Tate, 1987). The church was built in the English Gothic style and was designed by the enigmatic Public Works Department's architect, A.C. Norman who was also responsible for designing most of the public buildings

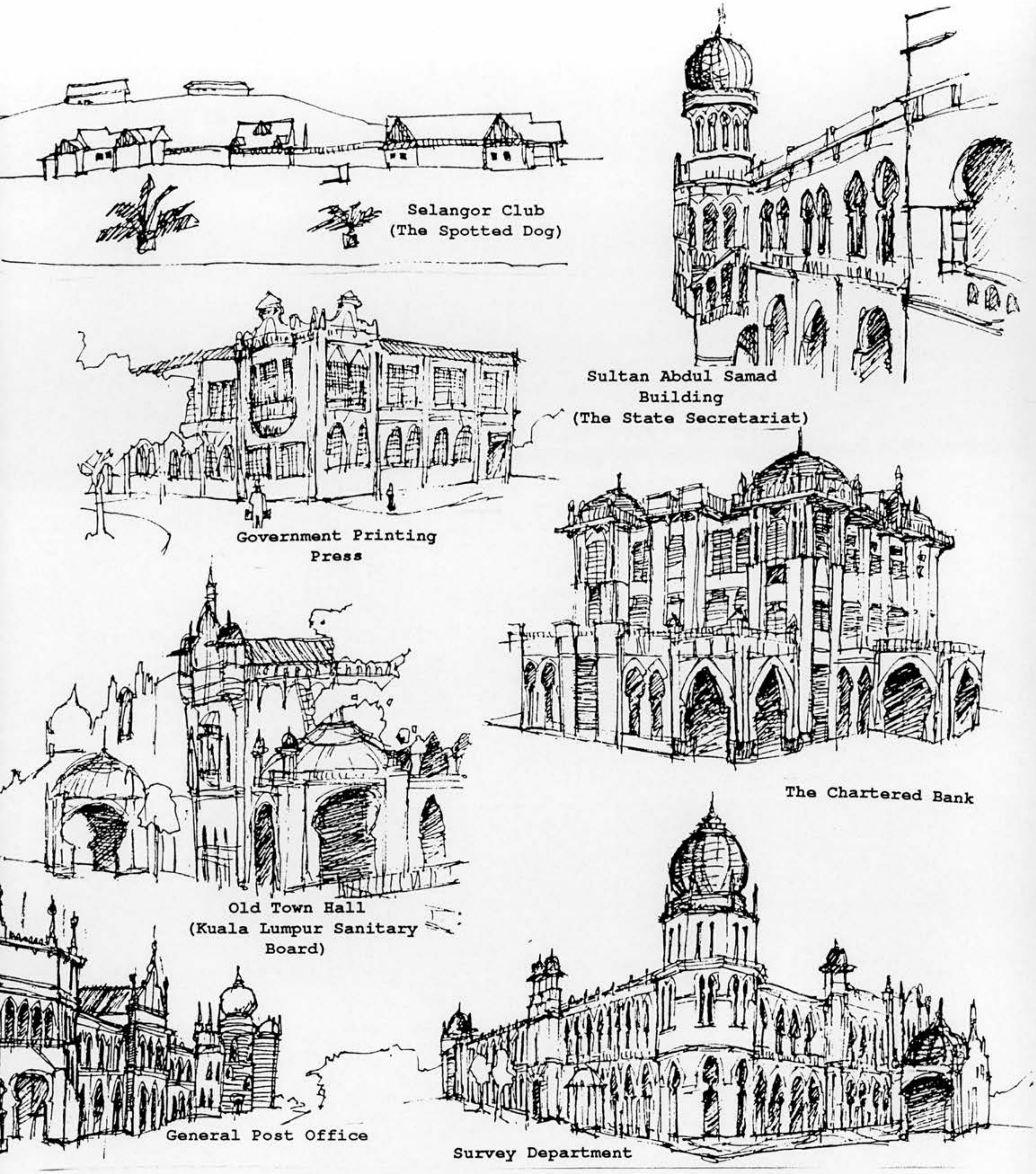
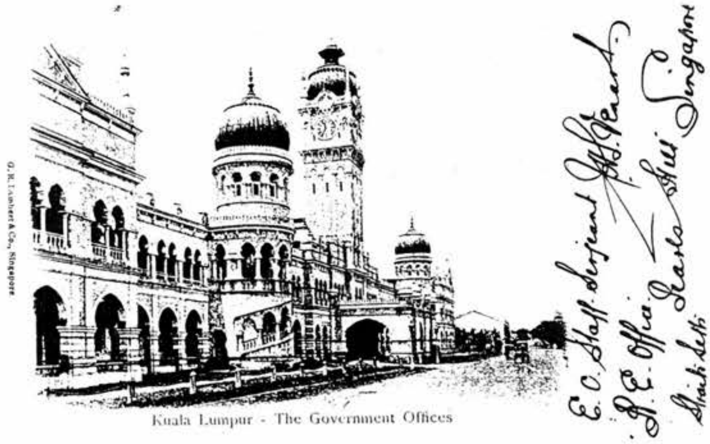
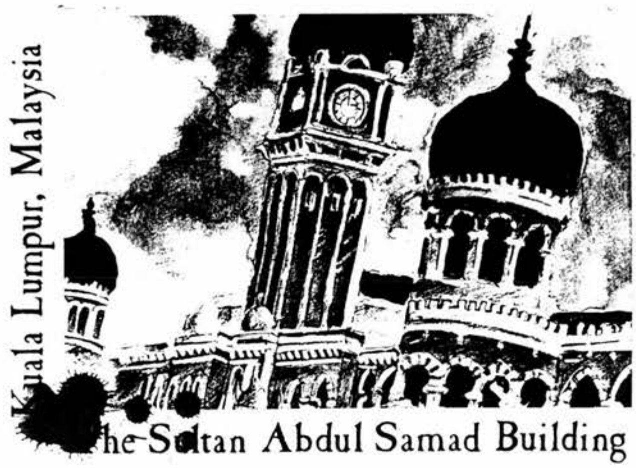


Fig. 2.9: **<u>Public Buildings Around the Padang</u>:** Around the Padang was centred the colonial administration of the Malay Peninsula. It was also the centre of social lives for the expatriates. Here they could promenade in the evening and mixed with their own kind in the Selangor Club. Except for the Spotted Dog which was designed as a mock-Tudor Building and the Government Printing Press which presented an English Classical Renaissance Revivalism, the rest of the buildings were designed in Moorish Architecture to show sensitivity to the local culture.





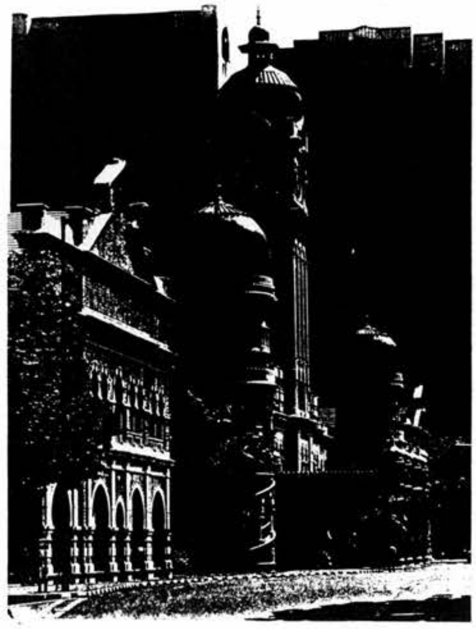


Fig. 2.10: <u>**The State Secretriat**</u>: The foundation stone for the building was laid down by Sir Charles Mitchell, the Governor of the Straits Settlements in 1884 and the building was completed three years later. Earlier photographs were taken between 1890-1910s. Today the postcards of the building are still very popular among both foreign and local tourists, testifying to its importance in the development of Kuala Lumpur.
(Source: Tate, M.D.J., 1987)

mentioned earlier. A cleanly mown Cow Grass (Axonopus compressus) lawn formed the compound of this church. Unlike other open spaces in Kuala Lumpur, this open space does not have a proper name but was commonly referred to as Laman Gereja (Church's Compound).[49] It used to be maintained by the Anglican Church. Groups of mature Raintrees (Entrolobium saman) provided shade. The natural curves and flow of the then not yet straightened Gombak River which divided it from the hustle and bustle of commercial activities along Batu Road (Tuanku Abdul Rahman Road) to the east, must have provided tranquility and serenity to the area. As such it used to be a favourite family picnic site among the expatriate families after they had attended Sunday services at the church. A British presence survives here. It is one of the very few such spaces still existing without any major modification and thus has significance in the social history of Malaysia. Perhaps for this reason alone, effort must be made to conserve it.

The next (Fig. 2.9) building took its place on the southern side of the Padang. This was the Government Printing Office. It was in the words of Tate (1987), "the odd man out". This was because instead of having a Moorish facade, it presented a neo-Renaissance facade, probably the style originally intended for the State Secretariat had it not dawned upon the British Resident-General that this was an administrative secretariat for a Muslim protectorate. The Chartered Bank building was built next to the Government Printing Office so that it benefitted from a location close to the General Police Station on the Bluff and the clientele from the surrounding government offices.

The Padang became the centre of the town civic life. The European community congregated there in the evenings for a stroll and socializing activities. Gradually they formed an exclusive European club, called the Selangor Club.[50] It was a place where the tuans and their mems socialized with their own kind.[51] The building built for this purpose was situated on the western edge of the Padang, thus completing its enclosure. It was called the Spotted Dog, probably after a dog of a high ranking official's wife, and was built in a mock-Tudor style.[52] The Padang itself became a premier cricket ground when it did not serve offical ceremonies or parade. The Kuala Lumpur Sanitary Board built the portentously official Hargreave Fountain on the south-eastern corner of the Padang.[53]

The Padang was renamed the Dataran Merdeka in 1990.[54] In a frenzied act of self-glorification, the government started the transformation of the Padang in 1988 (Fig. 2.11). An underground car park, similar to the one found under London's Hyde Park and a shopping arcade were built under the Padang. On the surface, a complex of raised platforms for stage performances and public rallies complete with a big video screen, and fountains were built at the southern end of the Padang. A flag-pole, claimed as the tallest in the world to hold the world's largest flag was also contructed at the southern end of the centre-line of the Padang. The surrounding area was densely planted with expensive flowering plants and palms. This extravagant civic project was meant to commemorate the country's coming of age. It was carried through despite spirited public opposition, especially from environmentalist and conservationist groups. It was a celebrated campaign not only because it was successful in making the government scale down the original proposal, even to the extent of replanting the original turf, but it was the first time Malaysians campaigned for a heritage derived from an era they would rather forget; a better prospect perhaps for other similar resources, if only the public could identify with them.[55]

Located to the north of the Padang is an ornamental open space called Laman Restoran Rakyat (Fig. 2.7). It was first constructed in early 1970s at about the same time as the construction of a people's restaurant, the Restoran

Fig. 2.11: <u>Transformation of the Padang</u>: In 1988 work on transforming the historical Padang to Dataran Merdeka (Independence Square) started. The raised platform with the world's tallest flagpole was constructed on the eastern side (above) and below the Padang was constructed an underground carpark and shopping arcade (below)

Rakyat, in the middle of it.[56] The park is quite well served with benches and garden lights with a huge fountain in the middle. The park was redesigned in 1990. The Restoran Rakyat was refurbished and turned into a tourist information bureau in 1988 (Fig. 2.7).

The park retained the ancient looking Raintrees (Entrolobium saman) that were planted during the formative years of the city. This planting was strengthened with native trees such as Kayu Manis (Cinamemon iners), Bungor (Lagestroemia speciosa), Jambu Laut (Eugenia grandis), Jati or Teak (Tectonia grandis), Jacaranda (Jacaranda mycrophylla) and Semarak Api (Delonix regia).

The redesigned park emphasized the Malay vernacular character through the use of herbaceous species of flowering plants. Among those used are traditional plants such as several types of Hibiscus (Hibiscus rosa-sinensis), Bougainvilleas (Bougainvillea glabra, B. fortunii), Poinsetta (Euphorbia pulcherrima), Gardenia (Gardenia florida), Oleander (Nerium oleander), and Candle Plant (Pachystachys lutea). Bleeding-heart vine (Clerodendrum thomsoniae) are planted to climb over the bamboo trellis as they would normally be found behind a rural Malay residence. There are also groves of Scented Pandan (Pandanus sp.) and Mengkuang (Pandanus veitchii). Coconut palm (Cocos nucifera) and Lontar (Borassus flabelifer), very important features of a typical Malay settlement were also planted.[57] A reasonable range of aquatics and hydrophytes such as dwarf Bundung (Cyperus polystachyus) and some varieties of small Kelady (Caladium sp.) could still be found along the stretch of still unconcreted bank of the Gombak River that it shared with the Laman Gereja.[58]

The only other major open space in the town centre was situated on the eastern bank of the river, on the probable site of the first landing of Chinese miners. It was named the Market Square on account of its origin. After the death of Yap Ah Loy, the British ordered that his market which was located on this site be demolished and a new market, called the Central Market be built about 100m to the south of the site. The building has now been conserved by turning it into an art market catering for the increasing tourist industry. The vacated site of Yap's market was turned into a town square with the statue of none other than Sir Frank Swettenham, unveiled by Sir Lawrence Guillemard, the then British High Commissioner of the Strait Settlements, in 1921 amidst pomp and ceremony and attended by all the sultans and high ranking colonial officials.[59] However, the innocence, energy and enthusiasm of the Chinese market traders soon turned the town square into an open and stinking vegetable market. It was only with much effort that it was reclaimed in the early 1960s. Before that, the monument however stood there in filth and squalor until it was removed by the Japanese during the Occupation and after the Independence it was relocated outside the wall of the National Museum. Perhaps this was not only to placate the nationalistic fervour that ran high then but also a respect for the country's Islamic tradition of generally frowning upon human glorification through such art forms (Fig. 2.12).

At the end of Market Street, and only about 100m from the Market Square, a minor square that resulted from the meeting at acute angle of the High Street and Petaling Street, could be found. In the early days this small square was well provided with sheds, a fountain and seats (Fig. 2.13). Because of its location, it was highly used during the early years. Facing onto the square was one of the earliest known Late Shophouse Style buildings, namely the Commercial Press (Fig. 2.13). It was to become the architectural style that dominated the streetscape of Kuala Lumpur Old Town until now.

The pioneering activities in the founding of the town left a lot of historical landmarks testifying to the adventurist spirit of the time. Some of these were related

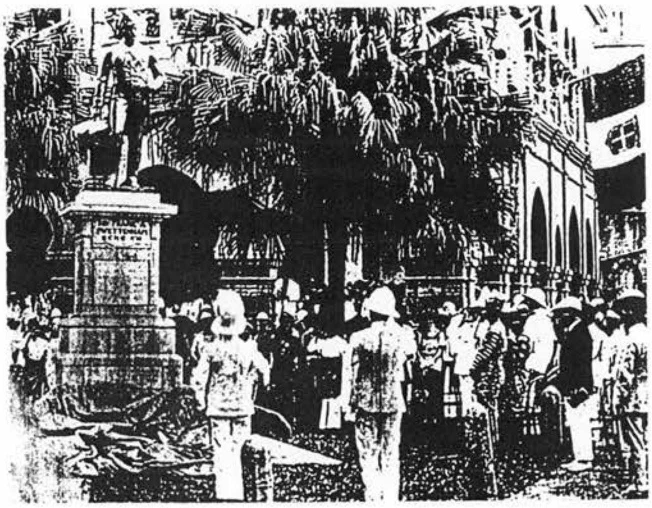


Fig. 2.12: <u>The Market Square</u>: The statue of Sir Frank Swettenham was unveiled amidst pomp and granduer, but the sheer deligence of the Chinese market traders turned it into a stinking open market. After being reclaimed in the early 1960s, it gradually detriorated into an ordinary bus stand.

Fig. 2.13: **<u>The Commercial Press</u>**: The earliest known example of the Late Shophouse Style in Kuala Lumpur Old Town. The plaza it faces is now no more than an ordinary bus stop - typical example of a loss of urban landscape resource.

directly to the administration of the fledgling settlement such as the headquarters of the country's first ever municipal police force (Fig. 2.14). Founded by the much feared Captain Syers, the force operated from a modest looking building on Station Road (Balai Polis Street). The living quarters of the captain situated at the other end of the street, continues to be connected with crime-busting activities to this day. It is now the headquarters of an equally feared Anti-Corruption Agency (BPR) (Fig. 2.14).

Only about 100m from the police station and at the very end of the High Street could be found a site of a former building which perhap could claim to be the unenviable first in crimes of passion among the early expatriates. It involved the murder of a Mrs. Proudlock's lover which provided Somerset Maugham with his best known short story about colonial Malaya, "The Letter" (Tate, 1987)(Fig. 2.14).[60] Standing on the site now is the headquarters of the country's first ever traffic police force. Standing next to it is a building which embodies the educational history of the country. Currently, the modest building is unoccupied and a haunt for off-duty, and sometime "on-duty" policemen. The building used to be the Victoria Institution (popularly known as the V.I.), the first English-medium boys' school in the country. It took its name from the fact that it was largely financed out of the surplus funds raised to mark the Silver Jubilee of Queen Victoria. The school had truly Malayan antecedents as its list of sponsors was headed by Sultan Abdul Samad and included the town's last Capitan China, Yap Kwan Seng, the tin millionaire so generous with his money; Loke Yew, and the ever-prominent Thambusamy Pillai. Its first headmaster was the Revd. Frederick Haines who was also the first inspector of schools in Selangor and the first vicar of the Anglican Church of St. Mary's.[61] When the school moved to a more salubrous surrounding on Petaling Hills, the building was taken over by the Kuala Lumpur Technical

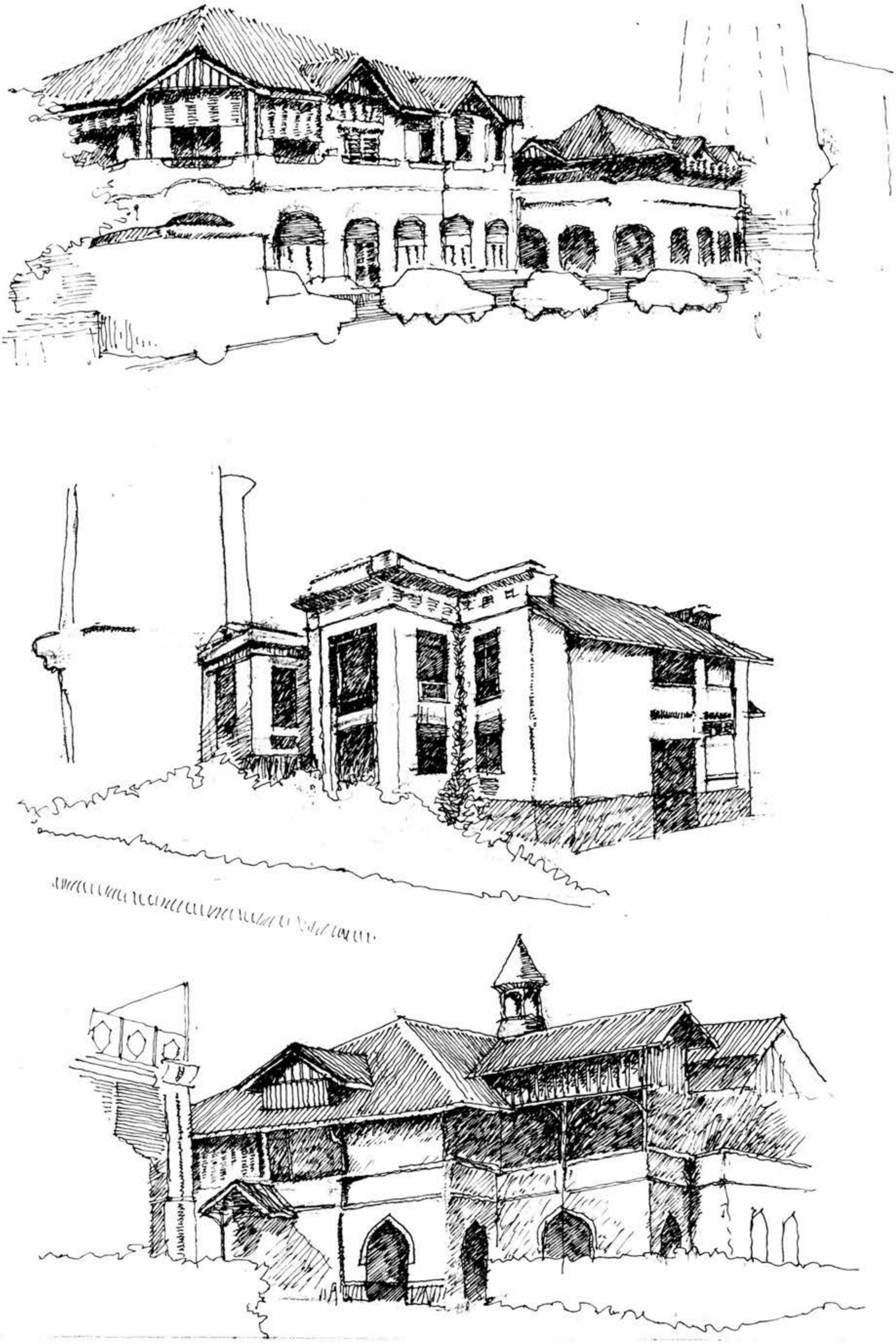


Fig. 2.14: <u>The Locale of Somerset Maugham's "The Letter"</u>: Jalan Bandar Police Station (above), BPR Headquarters (middle) and the former Victoria Institution (VI) with the headmaster's residence.

School which trained junior technicians for the Public Works Department. This school later was upgraded to the Malayan Technical College (1945), to a university-college, the National Institute of Technology (1973) and lastly the Universiti Technology Malaysia (1975) at it new campus in Semarak Road (Gurney Road), Kuala Lumpur.[62] Its last official use was as an experimental theatre which later moved to the old Town Hall.

Rapid economic growth of the country was recorded in the commercial houses such as the Lee Rubber Building (Hang Lekir Road), John Little (Holland Road), Whiteway Laidlaw (Java Street), Chow Kit's Store (Holland Road), and Merchantile Building (Market Square). The Lee Rubber Building symbolized the prosperity of the time when Malaya was the largest producer of rubber in the world (Fig. 2.15). An excellent example of an Art Deco Style building, it marked a break from the traditional, though flamboyant, Chinese shophouse architecture that occurred just before the outbreak of the Second World War. John Little and Whiteway Laidlaw embodied the success of small commercial establishments in breaking the monopoly of the great British East India Company. Chow Kit's Store was opened by a truly rag-to-riches Chinese merchant who later became a Capitan China. The opening of Merchantile Bank confirmed Kuala Lumpur as a financial centre that could rival any in the region at that time.

The British were also responsible for the urban roadside character of Malaysia; wherever they settled in the Malay Peninsula, they planted shade-giving trees, although they were mostly exotics from India, Sri Lanka (Ceylon), Thailand or Burma such as the Angsana (Pterocarpus indicus), the Jamerlang (Pterolorum peltrocarpum), the brightly flowering Semarak Api (Delonix regia), Hujan Hujan (Entrolobium saman), the False Mahogany (Swetania microphylla), Indian Laburnum (Ficus fistula) and the graceful Janda Merana (Salix babylonica). These trees

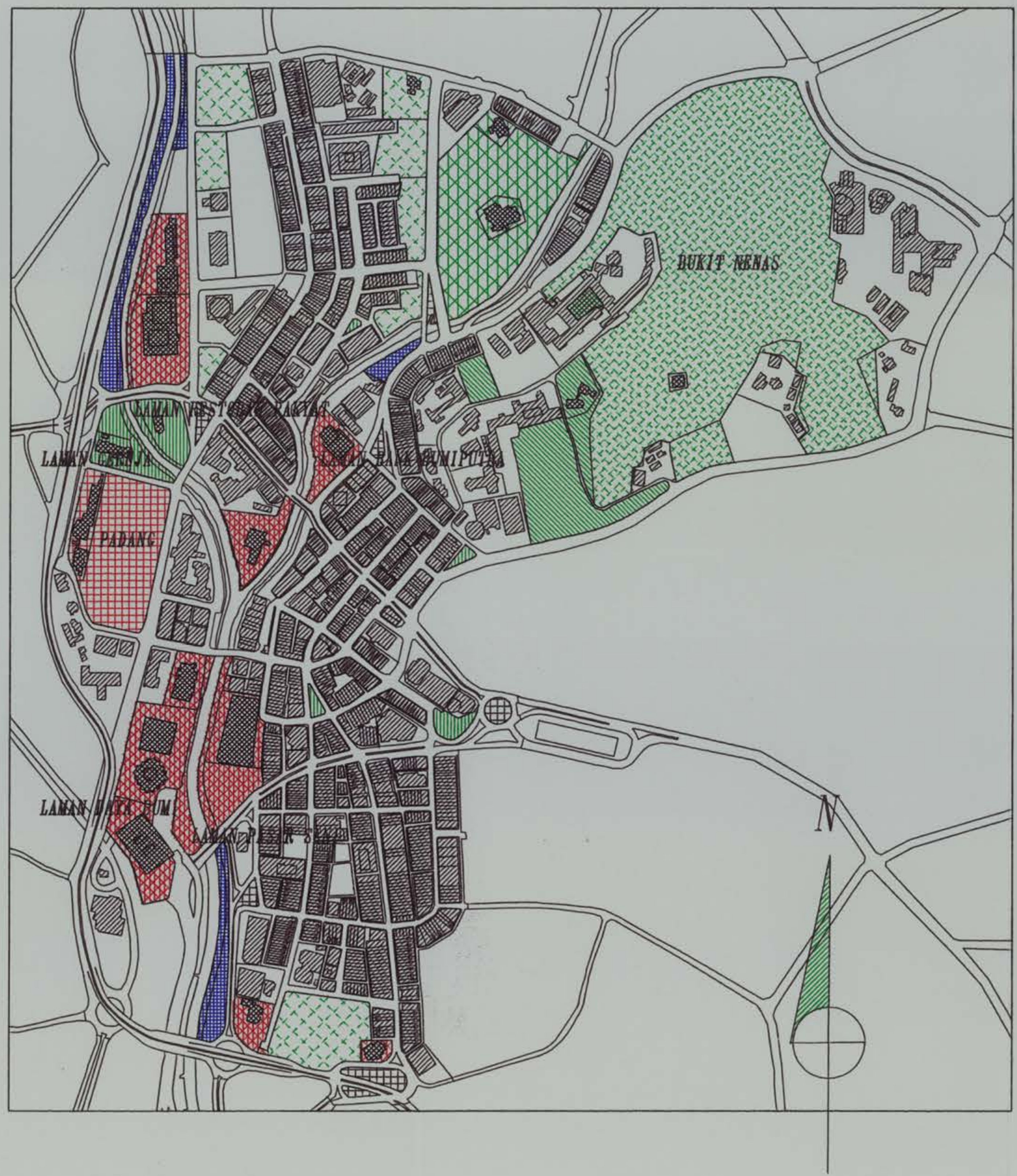
Fig. 2.15: **Art Deco Buildings:** The Lee Rubber Building (above) symbolized the prosperity that was derived from being the world's largest rubber producer. The Central Market (below) had been conserved as reused as Art Market - possible way of conserving an historical building.

were either planted in rows along the streets or in informal groups in areas of congregation such as jetty-heads, bus stands, and open spaces. They were, however, planted in formal rows in town squares and event grounds such as the Padang or the Market Square. Alfred Venning was again the man most credited for the planting around Kuala Lumpur Old Town. Many of these trees still adorn the sides of major roads, public open spaces and river banks in Kuala Lumpur. On roadsides, such groups might indicate important transportation terminals or bus stops.

Kuala Lumpur Old Town also has a significant stock of natural urban landscape resources (Fig. 2.16). The first of these is the Bukit Nenas Forest Reserve. Unique to Kuala Lumpur, is a small hill, called Bukit Nenas (Fig. 1.2) which had been left virtually untouched by development. Nature and a few fortunate accidents of history have accounted for the survival of this unique rainforest. Firstly, the cassarites or grains of tin ores were mostly found in alluvial swamps in the lowland, thus eliminating the hill from the preying eyes of tin prospectors and miners. Secondly, the habitual dislike of the native Malays of living on hill slopes because of the need to be as close as possible to the river-based transportation system, meant that the area was not ideal for their settlements. The superstitious practices of the Chinese and some Malays of leaving offerings to the spirits purported to be residing on the hills gave the area a kind of taboo. The choice of the eastern slope of the hill as a location for a building to house the Department of Aboriginal Welfare was therefore a very wise one. This was because the aborigines, known as Sakais among the British, shunned unnecessary contact.[63] The myths and tales connected with them further protected the area from intrusions. Lastly, the gradual encirclement of the relatively small hill by the native settlement (Kampong Bahru) and Chinese settlements (Pudoh, Ampang and the commercial centre) made it very unattractive to the

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



FEDERAL TERRITORY OF KUALA LUMPUR:
LOCATION OF THE STUDY AREA

MAJOR GREEN SPACES

FIGURE NO.: 2.16

LEGEND

- FOREST RESERVE
- FORMER TIN MINING LAND
- RIVERSIDE GREEN
- CEREMONIAL PARK
- URBAN PARK
- COMPOUND
- PLAYING FIELD
- ROAD-RELATED O.S.
- VACANT

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, April, 1993

File: MAJGREEN.AML

Source: Dept. of Urban Planning, DBKL & Field Check, May, 1991

British expatriates who preferred not to live among the native and Asiatic population. When Christian missionaries built their churches, schools and convent in the area, they were asked to locate them at the foot of the hill and slightly to the south-east less they would offend the local Malays who were on the west, thus saving the hills from this source of development. In 1904, the hill was declared a forest reserve by the British administrators on the advice of one very far-sighted forest conservator, making it the oldest forest reserve in Malaysia. It was originally named Weld Forest Reserve, after the name of the colonial officer responsible.[64]

The hill is perhaps the only real natural habitat left within the old town, if not the whole of Kuala Lumpur. It is also probably unique as the only known piece of tropical rainforest that is completely surrounded by urban development in the whole world. Areas of the forest which have been left relatively untouched, have developed naturally. The forest is of a lowland dipterocarp variety. Despite its location and few attempts at "modernising" it, the forest is still quite rich in wild fauna and flora.

Some trees grow to more than 40m in height. A few emergents mostly of varieties of Meranti (Shorea curtissi and S. agami) are within the luxuriant plant communities (Ahmad, 1991).[65] Below this layer is the main stratum at about 24-30m. This layer comprise of a dense growth of dipterocarps such as Sarcotheca griffithii, Dyera costulata, Hopea sp. and Canagium sp. Smaller shade-dwelling trees grow below the second layer such as Diospyros hermaphroditica, Gonystylus veluntinus, Memecyclon sp., Barringtonia sp., Whiteodendron moultonianum, Adinandra cordiifolia, Canthium sp., Gardenia tubifera, Mangifera havilandaii, Madhuca crassipes and Garcinia parvifolia (DoF, 1984).[66]

Ground vegetation is sparse within this forest reserve but is luxuriant along its fringe and in the modified part of the forest reserve which is mainly found on the north-eastern and southern fringes. Perhaps the seemingly thick wall of secondary forest vegetation, encouraged by the sun around the fringe has been the saviour of the natural forest from the general urban population unfamiliar with the real characteristics of a rainforest. Though the ground vegetation is sparse as is characteristic of a mature lowland rainforest, an interesting array of ground-level species do exist. Among these are the ground orchids that are normally associated with dry podzolic soils. Other ground-dwellers are the various types of broad-leaved rhizomatous plants such as the various types of wild ginger such as Tepus (Achasma megalochilos), Tepus Merah (Alpinia purpurea), Tepus Kajai (Alpinia rafflesiana), Tepus Tanah (Zingiber spectabile) and Setawar (Costus speciosus). Various other herbs such as Aglonema roebelinii, Birah (Spathiphyllum wallisii) and Wild Siantan (Ixora lobbii) are also found on the forest floor (Ahmad, 1991). The most interesting phenomena on the forest floor are the various types of fungi that feed on the dead wood and litter of leaves such as the Hyrocybe sp. and Trametes sp. (Ahmad, 1991). Some of these are fluorescent and seem to light up small nooks and niches of the dimly lighted forest, creating a ghostly and surrealistic imagery to the eyes of unfamiliar city-dwellers. In fact this unfamiliarity and the superstitions associated with it has done much to keep the forest intact and largely avoided by city dwellers to its benefit.

Llianas and other climbers fighting for light are quite common in the forest. Among these are the Bauhinia sp., and the Uncaria sp. Ephipytes that dwell in the crowns of tall and medium-sized trees are also a common sight. Among the most common ones are the Midin (Pteris cretica), Bird Nest Fern (Asplenium nidus), and Stag's Horn Fern (Platycerium sp.). Some varieties of orchids, for example, Maxillaria eburnia and Taeniophyllum sp. colonise the old branches of mature trees (Ahmad, 1991). Humus collects in the bases of these ephipytes, providing nutrients and collecting rainwater. Another type of climbing plant common in the forest reserve is the rattan palm (Daemonorops crinita) and Rotan Manau (Calamus manan) (Ahmad, 1991). Other types of palms such as the Fish-Tailed Palm (Coryota mitis), grow in the shaded area under tall emergents.

Immediately surrounding the remnant forest is an area that divides the forest and an area of human habitation. The area called "belukar" in Malay, is normally referred to as secondary forest. Natural revegetation has taken over this area. Typical of this forest are pioneer species such as the two most common Purang or Macaranga (Macaranga triloba and Macaranga gigantifolia). Among other tree species are the Common Fig (Ficus sp.), Kadam (Anthocephalus chinensis), and Fragrea crenulata. A luxuriant growth of herbs can be found within this area. Among the most important species here are Heliconia indica and Giant gingers of the Scitamineae. Wild bananas (Musa truncata) tend to colonize the eroded bare slopes found on the eastern part of the forest reserve. Another colonizer of bare soil is the hardy grass, Lalang (Imperata cylindrica). This grass covers quite a substantial open area on the south-eastern slope, rarely allowing any other plant species space to develop. During long dry spells, bush fires occur in this area feeding on the dried litter of this particular grass. The plant seems to relish the ash of such fires as they seem to take very little time to completely cover the area again. Leguminosae such as Semalu or Touch-me-not (Mimosa pudica) is commonly found at the slightly moist base of the eroded slopes.

In the ecotones between the secondary forest and the undisturbed forest, heavy growth of fern and aroid bole climbers such as Scindapsus sp. commonly occur. Also found in this area are saplings of wind dispersed trees like the Pulai (Alstonia nobilis) and Silver Wattle (Acacia cicinata).[67] Saplings of Campnosperma auriculatum, Parashorea malaanonan, and the monopodial undergrowth treelet, Agrostistachys longifolia, compete for light in this thicket. Clumps of bamboos, such as Buluh Betung (Schizostachyum grande) and Buluh Galah (Bambusa vulgaris) are scattered within the ecotone. Where there are wet areas at the foot of the hills, one finds colonies of Giant Yam (Colocasia gigantea) and Common Kelady (Caladium sp.). Common Dumb Cane (Diffenbachia amoena) grows profusely in areas where the soil is constantly wet. Ferns are found in abundance in this band of vegetation. Edible Paku Sayur (Asplenium bulbiferum) colonizes shady areas, while varieties of Paku Kubok (Nephrolesis sp.) occupy areas of bright sunlight. Profuse growth of flowering herbs such as Bunga Cemara (Lantana camara), and Thunbergia (Thunbergia alata) compete with the fern for light. Moss fern (Selaginella martensii) grows vigorously especially on well-lighted slopes.

Considering its location, the forest reserve has a relatively rich fauna. Butterflies such as the Common Birdwing (Troides helena), Smaller Wood Nymph (Ideopsis gaura), Common Blue Bottle (Graphium sarpedon) and bees feed on the nectar of Bunga Tahi Ayam (Lantana sp.) and Wild Siantan (Ixora sp.). Insects that feed on the plants are part of the food cycle of the bigger lifeforms. Birds not only feed on the nectar of flowers and fruits of the trees but also on the insects. Some of these birds such as the beautiful green-feathered Punai or Thick-beak Pigeons (Treron curvirostra) feed in flocks on the fruits of strangling fig (Ficus sp.). Fruit-bats (Chironax melanocephalus), most probably from their hiding places in the limestone Batu Caves just outside the northern border of the Federal Territory of Kuala Lumpur, may be seen feeding on wild fruits at night in the forest.

A few small mammals are residents of this forest. Most of these such as the Dusky Leaf Monkey (Presbytis obscura), and squirrels (Lariscus insignis jalorensis) which feed solely on plants or parts of plants. A host of other small animals may be living in the forest. Because there has been no real study done to record them, information relating to their existence is scant. The existence of small trees such as Simpoh Air (Dillenia suffruticos) and Senduduk bush (Melastoma malabathricum) indicate good habitat for such small plant eating animals such as the legendary Malay Mousedeer (Tragulus kanchil).[68] One may also be able to see Malayan Pangolin (Paramanis javanica) working its way into the bark of fallen trees looking for ants and termites (Bellicositermes sp.). The Malayan Monitor Lizard (Varanus salvator) is also an inhabitant of the forest reserve.

Larger animals have most probably vanished into less hazardous habitat. As recent as just before the Second World War, a tiger (Panthera sp.) originating from this jungle was reportedly shot dead while prowling around the convent school, creating excitement among the school-girls but chilling fright to their expatriate teachers. Tamsin Luckham, one of the teachers, later found out to her astonishment that the girls were buying the tiger meat to consume so that they would become "big and strong" (Allen, 1983) - an example of numerous misguided dietary beliefs among Asiatics and which continued to be a source of threat to the wildlife.[69] Common reptiles such as the Leaf Snake (Dendroasois sp.) and Cobra (Ophiophagus sp.) that feed on frogs, and small mammals and birds are certain to inhabit the damp and cool areas of the natural forest.

As mentioned earlier, a few historical buildings share the hill with the forest reserve. The most important of these is the Bukit Nenas Convent (Fig. 2.17). It used to be called the Pudu English School.[70] Built in 1900, it was the first and the most prestigious girl school in the country. Because of the colonial government policy of segregated schools for the native and non-native populations then, the students were mostly daughters of rich Chinese towkeys and

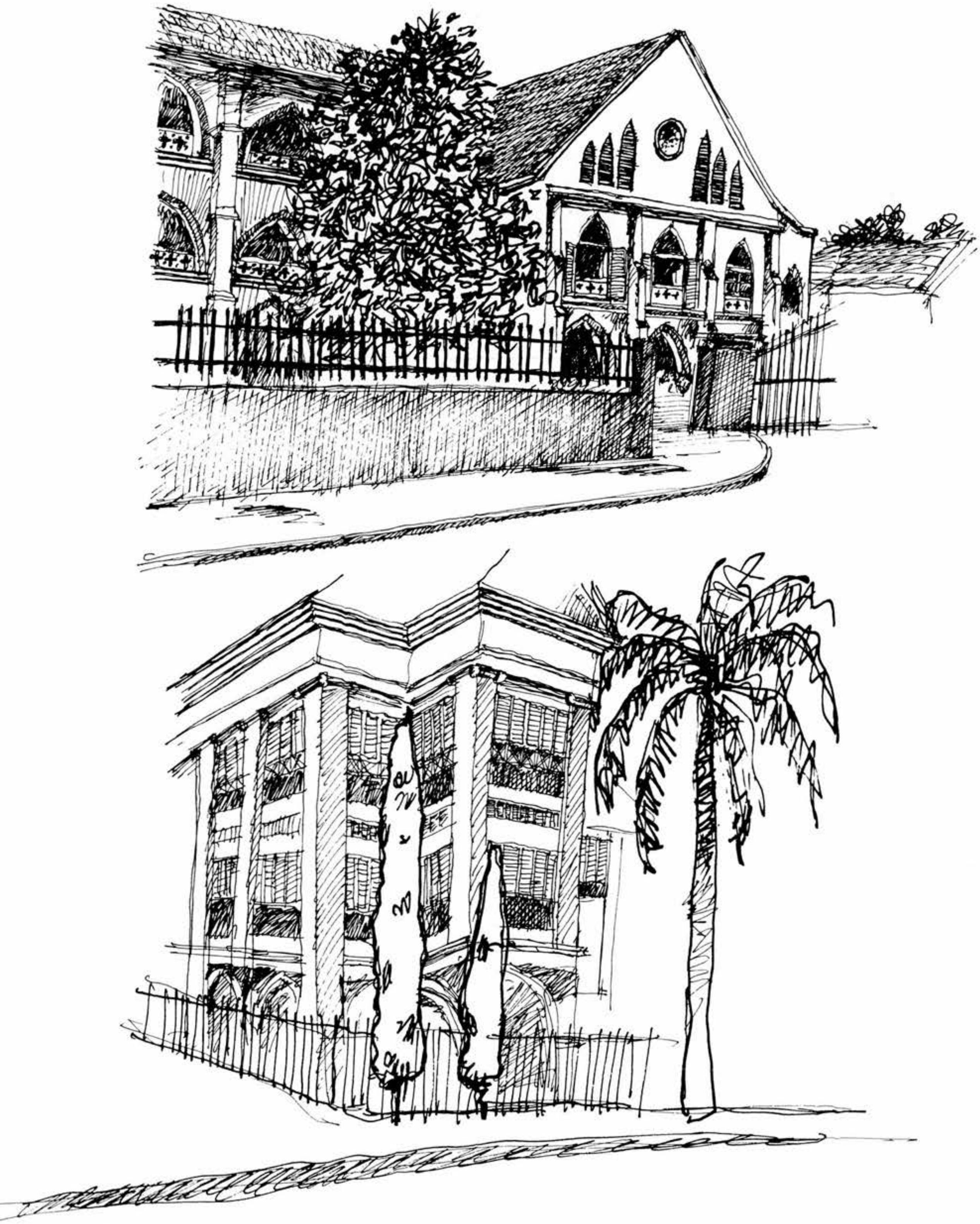


Fig. 2.17: <u>**Missionary Schools**</u>: They were among the first residents of the Nenas Hills.

Indian merchants.[71] Another school on the hill is the St. John's School founded in 1904 (Fig. 2.17). The school was one of the three premier English boys' schools in the town and it came complete with its church, the St. John's Church.[72] Like the convent, the students were mainly Chinese and Indian.[73] Other than the schools, a further historical site located on the hill just above the Bukit Nenas Convent was once a Malay fortication, presumeably used to defend the town during the Selangor Civil War (1866-74) (Chapter 6).

Another major natural urban landscape resource of Kuala Lumpur is the Kelang - Gombak River system. History and nature overlap here. Not only was the Kelang River the scene of the founding of modern Kuala Lumpur in 1857, it was also the locale of the founding of the State of Selangor. Tradition has it that the Kelang Delta was a dependency of the Palembang-based Buddhist Empire of Sri Vijaya as early as the 13th Century and was a subject of the Java-based Hindu Majapahit Empire in the middle of the 14th Century. Later on in the 15th Century it came under the rule of the indigenous Malacca Empire. During the period of Malacca rule, it was recorded that the area was already producing tin, and that the Chinese miners were involved in the production. A half-Chinese son of the Sultan of Malacca, Paduka Sri China, was appointed as its governor.[74] After the fall of the Malacca empire, the area was claimed by the Johore Empire which was ruled by the descendents of the Malacca rulers. When the Riau-based Bugis eventually captured power in Johore Empire, the area was ruled by a Bugis prince, Raja Lumu who was eventually enthroned as Sultan Sallehuddin in 1756 starting the present dynasty.[75]

The Kelang River is also historical because it was the epicentre of the Selangor Civil War (1866-74). This was because it was the major transportation route in the export of tin. Controlling strategic points along the river, such as the famous muddy confluence, meant controlling revenue derived from the metal. This war was of special importance in the socio-cultural history of Malaysia in giving the British the excuse for their eventual colonialization of the whole of the Malay Peninsula which subsequently led to the multi-cultural make-up of the country.[76]

By far the most important legacy of the river corridor to the landscape of the city is the open space. There is an existing regulation that requires a reserve of at least one chain (66 feet or about 20 m) to be set aside on both banks of the river. This regulation which was strictly enforced during the colonial days resulted in a green corridor along the Kelang - Gombak Rivers as they pass through the Kuala Lumpur Old Town. Old postcards show this corridor to be very rich in vegetation of various sizes (Fig. 2.4). No record of the exact plant species exist but it would be easy to speculate that groves of fruit trees traditionally associated with Malay settlements such as Durian (Durio zebethinus), Rambutan (Nepthelium sp.), Manggis (Mangostena sp.), Langsat (Langsium sp.), Jambu Air (Eugenia aqua), Mango (Mangifera sp.), coconut palms (Cocos nucifera), and Pinang palms (Areca catechu). Under these trees would be found shrubs common in the Malay Peninsula such as varieties of Dracaena sp., Common gardenia (Gardenia jasminoides), varieties of Cordyline sp., Cordiaeum sp., and Golden trumpet (Allamanda cathartica).

On parts of both banks left untouched by development, there were also some very important patches of natural riverine vegetation including such trees as Bebaru (Hibiscus tiliasus), Ara Babi (Ficus sp.), Fiddle-leaf fig (Ficus lyrata), Jejawi (Ficus benjamina), Jambu Laut (Eugenia grandis.), Ketapang (Terminalia cattapa), and Pulai (Alstonia nobilis). Some brightly coloured flowering riverine trees such as Bungor (Lagestroemea speciosa and L. Floribunda), Tulip Tree (Spahoedia sp.), and Jamerlang (Pterolorum petrocarpum) would have added colours to the river banks. At nights, some points of the bank would have been lit up by the florescent flowering Putat Tree (Baringtonia sp.) a very common tree along the rivers in the Malay Peninsula. Of course these clumps, especially those with the Hibiscus tiliasus and Baringtonia sp. would be lit up by thousands of Fire-flies during the night. Underneath these trees would be common undergrowth plants such as Dumb Cane (Dieffenchia amoena and D. maculata), Poinsetta (Euphorbia pulcherrima), Kelady (Caladium sp.), Aglaonema (Aglaonema crispum), and Spathiphylum (Spathiphylum wallisii). In areas that had experienced erosion, coarse grass such as Lalang (Imperata cylindrica) and Repok (Themeda villosa) would be found. In areas recovering from human invasion, Senduduk (Melastoma malabaricum) might be found. There are spots along the river banks where clumps of Buluh Betong (Bambusa vulgaris) would be found to grow profusely.

The British introduced exotic trees such as Angsana (Petrocarpus indicus), Hujan-hujan or Raintree (Entrolobium saman), and Banyan tree (Ficus bengalensis) at important points along the river. The existence of clumps of ancient-looking trees of these species are quite a good indication of the locations of former government jetties during the early days of the city when the river was the main form of transport. One of these clumps may be found at a point just above the confluence and behind the old Chartered Bank Building, a point probably related to the fortress or the schools and/or the Christian missions on the Bukit Nenas. Another important group of exotics is found just below the Market Street Bridge at a point of the Central Market (now the Art Market) (Fig. 2.15). The last important group is behind the government buildings just below the famous confluence indicating the location of a landing jetty that exclusively served the colonial government officials. In keeping with the English pre-occupation with clean cut lawn, the ground would be covered only with well-manicured

Cow-grass (Axonopus compressus). There would not be many instances of shrubs, either flowering or otherwise being planted under these trees. There are now a few important stretches of Cyperus alternifolius reed beds along the river.

Since its founding years, the city has experienced floods of variable intensity. In the early 1890s, the river was straightened to speed up the flow of excess water but this work did not involve any construction of embankment or retaining wall. This meant that the vegetation of the corridor was basically left intact to support the banks which were cut to a slope. Where necessary, a retaining wall of Bakau (Aviciena sp.) poles were driven vertically into the ground, to hold the banks.[77] The British colonial rulers, with a better technology, commissioned the building of the first length of stone and mortared retaining wall at a stretch below the Market Square and where the pioneers of Kuala Lumpur probably had first landed. There were several reasons for constructing the wall. The first was to provide a relatively flat-surfaced area to ease the movement of people waiting to board boats plying the river, and also the storage of materials such as tin ores awaiting transportation down river to Kelang and goods imported awaiting removal by their importers. The next reason was to stop erosion of the river bank due to increase in the speed of the flow of river from the increase in mining activities in the interior and from river straightening upstream. The building of this retaining wall gave the name Benteng (or Embankment) to this stretch of river bank (Fig. 2.18). It was something new to the local population, and became a very popular spot for social activities such as eating out at night from the food stalls attracted by it. These foodstalls were originally very modest attempts to provide quick food for the "coolies" or porters that were loading and unloading the barges with tin ores and other stores.

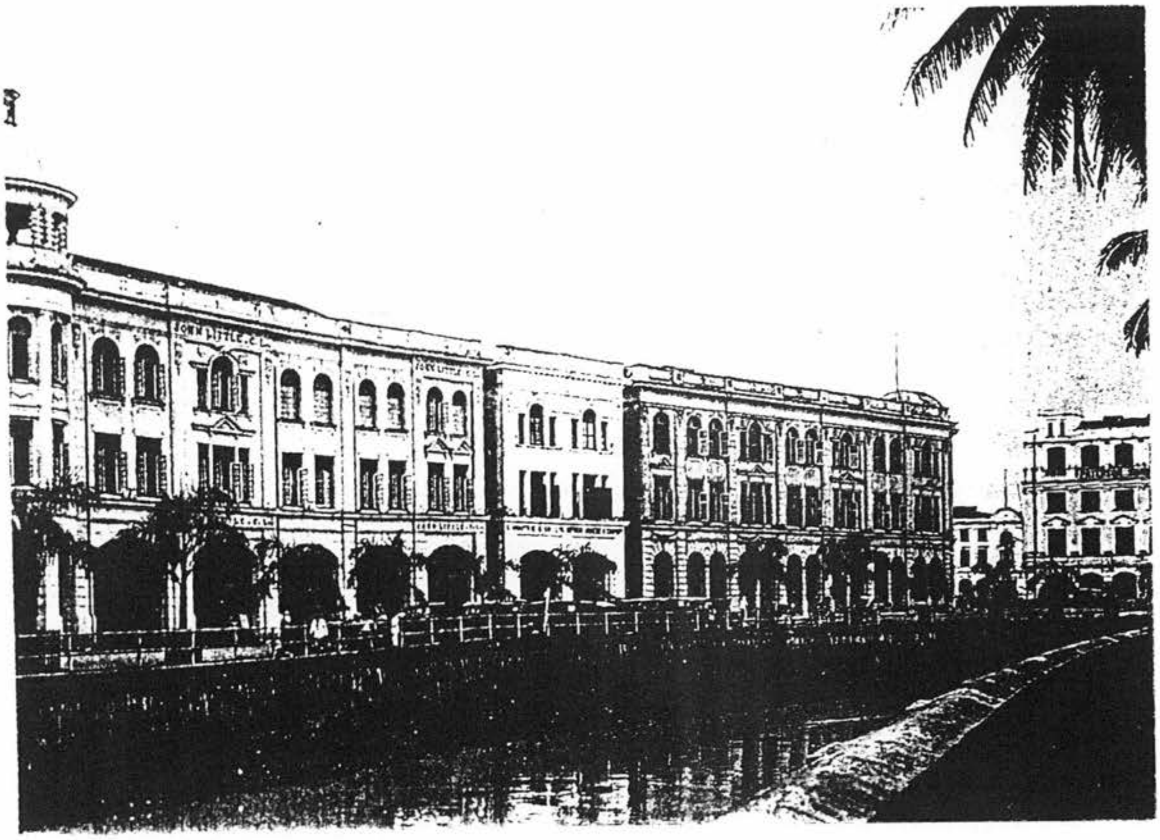


Fig. 2.18: **<u>The Benteng (Embankment)</u>**: The first stretch of the bank of the Kelang River that was concreted. The flat area served initially as a wharf, then a very popular night spot that served various types of local delicatessen. The area is now a pathetic-looking backyard of an international bank whose planning permission was connected with one of the biggest bribery scandal in modern Malaysia.

The change of mode of transport firstly from river to road, and then to railway in the early 1900s did not diminish the popularity of the spot, in fact it developed into a full-fledged night food market. The Benteng was still operating and extremely popular until the local authority decided to close it and remove the stalls to a former tin mining land by the Munshi Abdullah Street in 1985 in favour of a commercial bank's (the Chartered Bank) application to turn the area into its backyard and parking spaces. This was another example of a total disregard for the history of the place. Although the site transfer decision was taken before the adoption of Kuala Lumpur Structure Plan, 1984, the plan did not rescind the decision although it could have done so taking advantage of the revelation of a corruption scandal related to this planning decision.[78]

The City of Kuala Lumpur and the Department of Drainage and Irrigation (DID) is now busy implementing the latest recommendation by Australian civil engineering consultants, Sinclair Knight and Partners Pty. Ltd to strengthen the banks of the river with concrete walls from it sources in the foothills of the Titiwangsa mountain range. Under the scheme many parts of the river system have already been concreted including the stretch of both banks between Market Street Bridge and Munshi Abdullah Street Bridge and Market Street Bridge and the Gombak Bridge (Chapter 6). As for the Gombak River, the stretch from the Batu Bridge and the P.K.N.S. Building had been turned into Pudu Cut drain.[79] Other stretches are due to be completed in the mid-1990s. This work will obliterate the remainder of the natural river profile and with it what was once a very rich aquatic and riverside wildlife habitat. It will also wipe out completely the historic character of the rivers.

Bordering the corridor on the eastern bank are some of the most important buildings in the history of Kuala Lumpur

(Chapter 6). Among them are the Central Market (Art Market), and a row of shophouses. The end of row has been redeveloped as a high-rise branch of the Hong Kong - Shanghai Bank. Above the Market Street Bridge is a row of splendid Late Style Shophouses that have been turned variously into restuarants, banking and finance houses. However, from that point on, the original shophouses have almost all been redeveloped into tall buildings, housing, banks and corporate establishments, built in the anonymous international architectural style, except for the front-building of Bank Bumiputra which was designed as a greatly exaggerated vernacular Kelantan house - yet another example of misplaced enthusiasm.[80]

The Bank Bumiputra located just above the famous Java Street Bridge was built right up to the edge of the river, thus breaking, the continuity of the corridor. However, the bank did commission the design and construction of a small garden on a tongue of land between it and the bridge, called Laman Bumiputra (Fig. 2.19). The space was completely paved with interlocking pavers with a few planters and gazebos of Malay vernacular architecture. Within the constraints of space, only a few trees such Jejawi (Ficus benjamina), Jemerlang (Pterolorum petrocarpum) and Indian Laburnam (Cassia fistula) were planted. Planting quite rightly was limited in its use of herbs in a heavily used small urban space such as this. Bunga Kertas (Bougainvillea glabra and B. fortunii) and Hibiscus (Hibiscus rosa-sinensis) were planted on the pheripery of the space to screen the river from the public thus contriving to degrade the importance of a very important landscape resource of the city. Although just a few hundred metres from the landing site of the pioneers, the design completely ignored the historical importance of the event.

Below the Market Street Bridge, a 25 storey Bank Pertanian (Agriculture Bank) was built in the mid-1980s. A

Fig. 2.19: <u>Town Squares</u>: Kuala Lumpur Old Town does not have town squares in the real sense of the word. Laman Bumiputra (above) constructed in the early 1980s, set the trend for the development of small compounds related to business houses that may be used by the general public. It is designed in a vernacular Malay house compound style and is very popular with the general public. Laman Dayabumi (below) is another example but because the designers' failure to adapt the Middle-eastern motifs to the tropical climate of Kuala Lumpur, the compound is hardly used by the local population. Unfortunately, even though both are located on the banks of the historical Kelang River, the designers ignored this particular resource.

part of the Moorish front facade of a former Malayan Railway godown is being kept as its perimeter wall probably to remind the bank's customers who are mostly members of farmers and small holders' cooperatives of the "progress" the country has made since then.[81]

Further downstream and on the remaining part of the former Malayan Railway marshalling yard, now stands one of the most prestigious developments in Kuala Lumpur, the Dayabumi Complex. The complex consists of the 25 storey Dayabumi Tower, housing the temporary headquarters of PETRONAS, the national petroleum corporation. A bigger but less tall (only 16 storeys) building houses the General Post Office, removing the function from the old Moorish building next to Sultan Abdul Samad Building by the Padang. Both these buildings are being promoted as examples of modern Islamic architecture because the facades consist of arched windows and Arabesque grill-work. Underground shopping arcades and parking connect the complex and the bank.

The landscaped compound of the building is called Laman Dayabumi (Fig. 2.19). As with the buildings, the space has a large area covered with tiles in Arabesque geometric pattern. Within this space are Jejawi (Ficus Benjamina) and conifers such as the Sumatran Pine (Casuarina nobilis) and Blue Juniper (Juniperus sp). Yellow Cane Palms (Chrysalidopcarpus lutescens) and Red Cane Palms (Lakka sp.) are planted in regularly spaced planter boxes in the corners of the plaza.

The river corridor bordering the space is planted in a more naturalistic style with Kelapa Mawar (Cocos nucifera dwarf), Bungor (Lagestroemia floribunda), Jemerlang (Pterolorum petrocarpum), Jahar (Delonix regia), Janda Merana (Salix babylonica), Indian Laburnum (Ficus fistula), Jacaranda (Jacaranda autifolia) and some local fruit trees such as Bacang (Mangifera sp.), Manggis (Garcinia mangostana), Langsat (Lansium domesticum) and Cempedak

(Artocarpus integer). There are also clumps of bamboos (Shizostachyum grande) and several varieties of palm trees such as Lontar (Borassus flabellifer), Talipot (Corypha umbraculifera) and Chinese Fan Palm (Livistonia chinensis).

Herbaceous plants used include Hibiscus (Hibicus rosa-sinensis) and Bunga Cemara (Lantana camara), Little Lady Palm (Rhapis excelsa), Rhoe bicolor, Cordyline (Cordyline terminalis), Dracaena (Dracaena fragrans, D. sanderana, D. marginata and D. deremensis), Poinsettia (Euphorbia pulcherrima), Nafiri (Gardenia florida), Sanchezia speciosa and Croton (Cordiaeum variegatum pictum). Smaller herbs such as Boat Lily (Rhoe bicolor), Pilea (Pilea caderei), Purple False Eranthemum (Pseuderanthemum atropurpureum), and Spathipyllum (Spathipyllum wallissii). Groundcovers consist mainly the hardy Cow Grass (Axonopus sp.). In some important corners, colourful groundcovers such as Quicksilver (Tradescantia fluminensis), White Lily Turf (Ophiopogon jaburan "Variegatus"), and Purple Heart (Setcreasea purpurea) have been used. Several climbers are also planted such as the sweet smelling Common White Jasmine (Jasminum sp.). Several varieties of Philodendron are planted to climb around the boles of some trees. Among these are P. selloum and Money Plant (P. scandens). The planted corridor is quite well furnished with garden benches and lighting. It is however disappointing that the designs of this "garden" and the adjoining plaza have not taken the river into consideration at all. Yet again the planners have overlooked its value.

Further up-stream, opposite the Bank Bumiputra are the Wisma Yakin, the City Hall's multi-storey carpark and the Selangor Mansion. Wisma Yakin was built by the Selangor State Economic Development Corporation (PKNS) in the late 1960s to provide modern commercial and office spaces for the newly emerging Malay urban traders. The Selangor Mansion was built by the same organisation at about the same time, as an 18 storey apartment block with a row of retail outlets in the ground floor. It was meant to help return the population to the city centre. The block has now turned out to be an eye-sore in the city centre with washing from bed-sheets to ladies underwear hanging from drying poles protruding from almost every window. It has also unfortunately acquired notoriety for prostitution, crimes and drug-taking dens. The multi-storey carpark was part of the now abandoned municipal traffic management scheme intended to solve the acute traffic congestion of Kuala Lumpur. In building these three buildings, the authority had conveniently exempted itself from the mandatory one chain river reserve regulation. All these buildings were built right to the very edge of the river. At this point, therefore, the corridor is totally blocked on both sides of the river. Unfortunately as both these buildings and the Bank Bumiputra have very close association with the government, they reflect very badly on the commitment of the government in conserving the river corridor as a unique asset of Kuala Lumpur's urban landscape resources. This apparent inconsistency in the authority's management of the regulation is and will be exploited by the powerful private sector in other areas, and may lead to the corridor being punctured at various other points.

Still further up-stream from the Selangor Mansion is a part of a former tin mining land. A plan to build a row of shophouses there had been put aside because the authority now feel that a more upmarket development could be built there, perhaps to include the area presently occupied by the Selangor Mansion. The vacant land has now been reclaimed and levelled. Part of the area had been surfaced and is being used at night as a food market selling various types of Malaysian dishes, and during the day as an open-air carpark. The rest of the area has been reclaimed by coarse grass such as Repok (Themeda villosa) and Lalang (Imperata cylindrica). Mining activities required the construction of a trunk mining track. This track eventually became Munshi Abdullah Street running through the middle of the mining area and connecting Ampang Road and Dang Wangi Road (Campbell Road). As the Bunus River was bisecting the mining area, it was convenient to use the river as the main drain by the roadside. This factor eventually turned the river into a concreted monsoon drain running parallel to the road. With the widening of the road in the mid-1980s, the river is now being forced to flow through huge concrete pipes normally used to make culverts. Since the pipes have been buried under about a metre of compacted soil, to all intents and purposes the portion of the river that passes by the Munshi Abdullah Road, does not exist anymore, further obscuring its true origin and cultural importance from the present generation.

When mining operations ceased just before the Second World War, the area was turned into an amusement park with a number of amusement activities, perhaps akin to a modern day fun-fair site, and including with betting and eating stalls, children's rides and "Wayang" (Chinese opera) theatre. For the more "enlightened" and often lonely expatriate bachelors looking for cheap entertainment, there was a cabaret in the dance hall of the Eastern Hotel situated at the southern part of the amusement park.[82] Most of the cabaret girls were Japanese, Chinese or European (Allen, C., 1983, M.D.J. Tate, 1984).

Most parts of the area have now been reclaimed for urban development such as commercial houses. The part that is left is mostly covered with very thick slime tailing, too expensive to reclaim. Accordingly the soil of the area, though compact, is friable. This is despite the fact that the slime is mostly of clay. During heavy rains, water bursts through the banks and stagnates for days in the area turning some parts of it into temporary wetlands and others into permanent ones. This greatly influences the type of vegetation in the area.

In common with the character of other former tin mining land, following extraction of the tin, a substantial area of sand and gravel was left behind. Most of this has now been quarried for construction materials leaving gaping holes and ponds. In time these holes have filled up and become shallow through sedimentation. Unique associations of plant species exist within this wetland. Giant Yam (Coloccasia gigantea) and Common Kelady (Caladium sp.) and Benta Grass (Preuria javanica) occupies areas which are constantly wet. There are no large mining ponds as in other areas, however in areas where water stagnates on the surface, water hyacinth (Eichhornia crassipes) and lilies are normally be found. On well-drained higher ground, tall grass such as Repok (Themeda villosa) and Lalang (Imperata cylindrica) are found to grow profusely. Woody shrubs, such as Senduduk (Melastoma malabaracum) grow in areas where sand and slime are found to inter-mix evenly. In well-drained and stony areas, Semalu (Mimosa pudica) competes with runners such as Kacang-kacang (Eragrostis elongata) and Ischemum muticum.

Ketapang (Terminalia cattapa), Simpuh Air (Dellinia sp.) and Bebaru (Hibiscus tiliaeus) are found growing scattered and individually within the area. Jemerlang (Pterolorum petrocarpum) and Batai Laut (Albizzia falcata) are also found in the area, though their origins are quite perplexing as there is no recorded incidence of these self-seeding on any other former mining land in the Kelang Valley. Their seeds may have reached the area either during the floods or during some windy spell and would find the wet site ideal for germination. Incidently there are many such trees planted on the open spaces and roadsides not very far from the area. On the drier areas, Silver Wattle (Acacia cicinata) are quite common.

The fauna of the area is also quite diverse. There have been no known sightings of any big mammals, but the area, in common with other mature former mining lands, is quite rich in birds. The Wak-wak (Actophilornis sp.), which very seldom fly but are very fast movers among the undergrowth are residents of the wetland. Here they wade in the shallow marsh and feed on small fish, earth worms and insects. The Pipit (Anthus sp.) feeds in groups on the ripe fruits of Senduduk (Melastoma malabathricum), False Cherry and the grains of wild cereals. Burung Ujuk or Malayan Lesser Grey Stork are sometime seen fishing in the wetland. The Kingfisher (Halcyon concreta) is the permanent resident of the wetland, perching on the branches of the few trees. Because of its solitary life-style and wide territory, it is never seen in pairs or in groups. There is a likely presence of Malayan Civet (Paradoxurus hermaphroditus) in the marshes of the area. The habitat is ideal for them, but due to their shy and nocturnal lifestyle, they are seldom seen. River Otters (Cynogala bennetti) are definitely one of the residents of the marshes, living especially close to the river. They feed on small crabs and fish. Their droppings found scattered along the banks of river and ponds testify to their existence.

A diversity of insects is found in the area including common butterflies, bees and dragonflies feeding on the nectar of flowering plants such as Senduduk (Melastoma malabaracum.), kacang-kacang (Eragrostis elongata) and the Yellow Flame (Pterolorum petrocurpum.). Black ants build their nests in the soil of the sandy area and red ants build theirs by folding leaves of Ketapang (Terminalia cattapa.) trees. Amphibians such as frogs and toads inhabit wet and shaded areas below the bushes of Repok (Themeda villosa) and the shady trees. The frogs are part of a food chain that includes snakes, birds, and civets that are common in this type of area.

Across the river were five historical bridges. The first one was the Market Street Bridge (Fig. 2.20). The bridge was built in early 1883 to replace the felled tree trunk that had served the purpose until that date. The

Fig. 2.20: <u>Historical Bridges</u>: The Market Street Bridge (above) was constructed in 1883 to take the place of the felled tree trunk which had served the purpose to that date. The timber structure was replaced in 1890 by the 30 m. lattice girder bridge. The Gombak Bridge (below) was constructed in 1884 and was also replaced with an iron structure in 1890.
(Source: Tate, M.D.J., 1987)

initial timber structure was replaced in 1890 by a 30m lattice girder bridge. The second bridge was the Gombak River Bridge built in 1884 whose timber structure was replaced likewise in 1890. The Java Street Bridge was also built in 1884 and it connected the Malay settlement on the tongue of the confluence with the Chinese section of the town on the eastern bank. The next two bridges of significance were the Campbell Road Bridge and the Munshi Abdullah Street Bridge. Both these bridges connected the Sungai Bunus tin mines and the Chinese settlement along Ampang Road. Later when mining activities ceased, the bridges served the Chinese amusement park which took over the former tin mining land.

Vacant lands, though very limited, are quite important landscape resources of Kuala Lumpur Old Town. Land may be vacant for a number of reasons. Firstly as the Kuala Lumpur Structure Plan study found out in 1984 the owners could not be traced. Many owners were thought to have gone back to their countries of origins after making their fortune. Others left when the country achieved its independence, and many Chinese families were totally wiped out by the Japanese during their short but extremely barbaric occupation in 1942-45. This incidently reinforces the need for a better information system for urban planning in the city. The buildings on some of these properties were demolished for public safety reasons resulting in gaps within a very heavily built-up urban area.

Secondly is the inability of owners to redevelop their dilapidated properties either because of lack of funds or their involvement in speculative dealings. Thirdly the lands may be part of a comprehensive redevelopment programme of Balai Polis Street (Station Street). However, because of the long time-lag between demolition and the actual rebuilding as in this case, the area is now covered with a natural regrowth of shrubs.

Very few have trees species grow on them. The most common tree species is the Ficus sp.. Herbaceous species are quite varied and interesting: various types of Kelady (Caladium sp) and Birah (Coloccasia sp.) are found in those parcels that are constantly wet because of poor drainange. Other plant species such as Lalang (Imperata cylindrica), Thunbergia alata, and Tibouchina urvilleana. In some very old vacant lands, Repok (Themeda villosa) is occasionally found.

CONCLUSION: THE FUTURE OF URBAN LANDSCAPE RESOURCES IN KUALA LUMPUR OLD TOWN

It is perhaps useful to recall that Chadwick (1971) defined planning as " a process of human forethought and action based upon that forethought".[83] Chapin and Kaiser (1979) emphasised the planner's role in practice as primarily concerned with managing change in the environment. As such the process of planning "functions to establish land use objectives, explore growth scenarios, test development alternatives, and arrive at land use decisions".[84] Bruton and Nicolson (1989) went further and say that "land use planners, if they are to be effective must become managers of environmental change".[85] In Kuala Lumpur Old Town, this does not seem to be the case.

It is obvious that urban planning involves making decisions about the use of environmental resources. Many of these decisions are taken to achieve well defined objectives and goals of a strategic plan higher in the hierarchy. The effectiveness of planning is measured against the goals and objectives. It is at the local level that the result is most noticeable. Therefore, it is only too obvious that whilst there is a need to adhere to some form of pre-eminent goals, there must be a certain degree of flexibility to allow for contingent actions at the local level, especially in cases involving landscape resources.

Urban developments have affected urban landscape resources in so many ways both directly and indirectly. While there are urban developments that enhance urban landscape resources in Malaysia, both in term of volume and quality, many have seriously depleted and damaged the resources. There are a number of obvious reasons for these effects.

Interviews with urban planners involved in the development of Kuala Lumpur during the fieldwork in May, 1991 confirmed the belief that the loss of so many urban natural landscape resources in the city were because their importance in an urban setting were not properly appreciated. For example, because they tended to collect floating debris, the reed beds along the Kelang - Gombak River were considered more as environmental hazards then as resources. On the other hand, the wetland that developed within the former tin mining land was an ideal breeding ground for malaria-carrying mosquitoes (Anophelis sp.).

The second reason for the omission and non-classification of particular features as urban landscape resources is the attitude of equating development with physical changes. This has resulted in a lot of urban landscape resources being "replaced" or "modernised" unnecessarily. Over-management in these forms is another main reason for the loss of resources, for example the mowing of river banks and draining of wetlands. There are many instances when the natural vegetation of trees and shrubs and topsoil are cleared and excavated only to be replaced with exotics and nursery-grown plants over expensive imported topsoil.

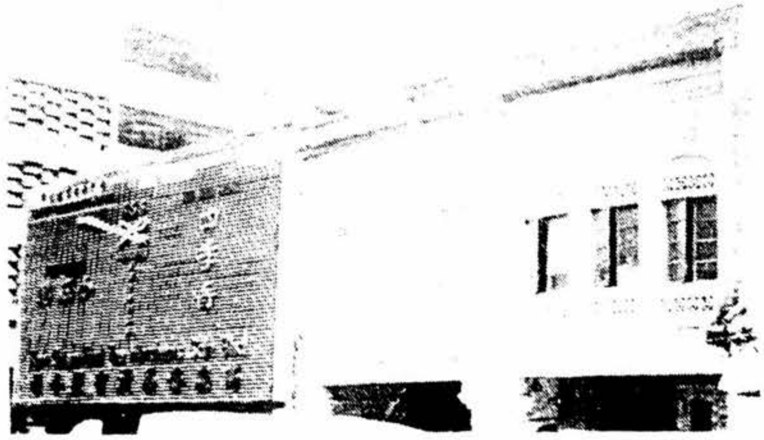
The biggest threat to existing urban landscape resources, at least in former colonial urban centres such as Kuala Lumpur, however, lies in the fickleness of the political attitude towards them. The colonial stigma attached to the inherited urban landscape resources such as colonial shophouses and urban parks, created some difficulties for the authority in justifying their conservation and protection. This was especially true in the first two decades following independence when nationalistic fervour was very strong. The need to provide evidence of progress after the country's independence led to the loss of many valuable inherited urban cultural landscape resources through misguided short-sightedness. Fortunately there is now evidence that this problem is diminishing. As the country matures, so does its political outlook. There is now a general sense of acceptance, though reluctantly in some quarters, that this part of its history has a very important role in defining the present persona of the country. A belated effort has been made to reclassify what were once considered as undesirable colonial hang-overs as historical landmarks. This action, although mainly for touristic reasons, has saved the remaining resources at least within the prevailing political climate. A small but symbolically a very important step was taken recently to reinstate colonial names of roads and streets under the new names in the old towns, including Kuala Lumpur Old Town. The Prime Minister in endorsing this move in 1990 said that this would not only help the tourists who might be former expatriates (or their decendants) during the colonial days to identify these places, but would also give a sense of history of the development of the country to the younger Malaysian generations.[86]

Colonial shophouses are closely related to the basic components of all urban fabric and to the morphology of Malaysian towns. This building type, by its homogeneity as well as by its architectural and aesthetic unity, is of historic and artistic interest.[87] After the Independence in 1957, the pressure for development was considerable. Architects trained overseas arrived back with a lot of ideas. They seemed to have little awareness of a contextual approach to urban design. When the new contemporary architecture appeared, the owners that could not afford to rebuild their buildings opted for the next "best" solution; putting up a mock metal facade (Fig. 2.21). Both these actions produced disastrous effects on the visual quality of the city centre. After the racial riots in 1969, the government adopted a "sky is the limit" policy to encourage investment. This has resulted in tall and totally unrelated buildings mushrooming in the town centre.

The problem has been made worse by the inability of municipal planners to come to grips with the consequence of piece-meal planning and planning control. It was the fashion until recently for redevelopment to involve defacing or even complete demolition of the old shophouses. However, the scourge of Kuala Lumpur's townscape must be the setback regulation introduced in the early 1970's. A setback of twenty feet from the road was made obligatory; much in the same way as the "prairie planning" that characterized the early British new towns, only that this was happening in an existing tightly built built-up area and which climatically required the streets and alleyways to be narrow. The regulation created pockets of unused spaces that broke the continuity that was so unifying in the townscape of the city centre (Fig. 2.21). It also exposed party-walls of adjoining old shophouses, providing surfaces to be colonized by moss and plants that weaken old walls.

Until recently, the planners were oblivious to the importance of the shophouses in the formation of the character of the city. The Structure Plan of Kuala Lumpur adopted in 1984 even went so far as to recommend that the shophouses be replaced with high-rise buildings to "enhance the image of the commercial centre of the nation".[88]

An equally important reason for the deterioration and depletion of urban natural landscape resources is the inability of those in the environmentally related professions such as landscape architects and urban planners



The Use of False Metal Facade

The Results of Setback Rule

Fig. 2.21: <u>Destroyed Continuity</u>: Piece-meal planning and the 20 feet setback regulation resulted in gaps in the street frontage, destroying the continuity that is so critical in the development of the character of the old town. One of the most damaging impact of the regulation is the exposure of party-walls on both sides of the gaps which allows moss and other saprophites to colonise the walls and gradually weakening them.

to convince the authority of the merits of environmentally friendly solutions to recurring problems, for example the annual flood of the Kelang-Gombak Rivers. Unless the authority is convinced that the solutions will bring better benefit both in the short term and in the long term, a one-off solution such as the present containing of the historic river in concrete walls will always present an attractive though misguided option to the authority.

Another threat to the river is from urban pollution. The river system at the moment is serving as an open sewer to the city of Kuala Lumpur. Three of the monitoring stations set up by the Department of Environment since 1980 are within the study area have recorded extremely high water pollution levels (Fig. 2.22). The pollution sources are not only within Kuala Lumpur Old Town but from all types of development upstream, including the river-straightening work. However, it should be pointed out that until as recently as the early 1980s, all drainage, whether surplus water or foul has been directed toward the Kelang River (Fig. 2.22). The stink from the water-borne debris is often overpowering. Even a leading landscape practice had ignored it when commissioned to landscape the compound of a leading bank situated on the riverside and close to the site of the original landing of the city founding fathers. The famous river is now virtually an open sewer that carries the waste and effluvia of development between concrete containment; a very far cry from its role in opening up the city (Fig. 2.23). Jeremy Purseglove (1989) described rivers as a cultural heritage and nothing can be more true in the case of the Kelang and Gombak Rivers that flow through Kuala Lumpur. But also as true are his words "Now, for the first time in history ......, the guardians (of the river) have become the destroyers".[89]

The pressure for development has also taken its toll on the limited small open spaces in the city centre. Many of these spaces have now disappeared. The much venerated

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

FEDERAL TERRITORY OF KUALA LUMPUR: LOCATION OF THE STUDY AREA

RIVER POLLUTION

FIGURE NO.: 2.22

LEGEND

★ MONITORING STATION

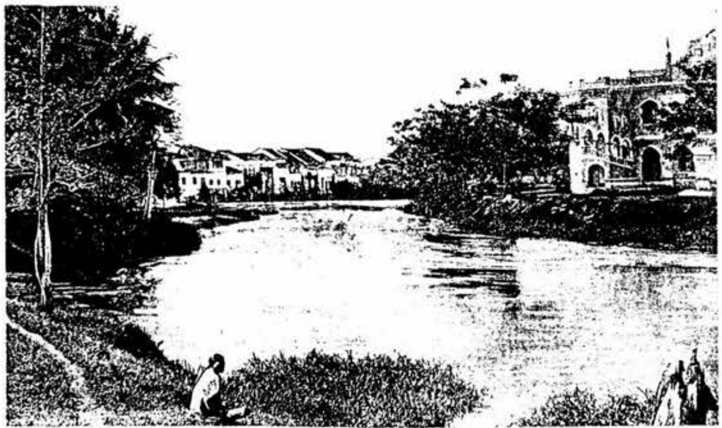
▽ DISCHARGE POINT

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

Source: Dept. of Environment, Malaysia, May, 1991

File: RMONITOR.AML



River View in Kuala Lumpur.

View of Kuala Lumpor from Market Street Bridge.

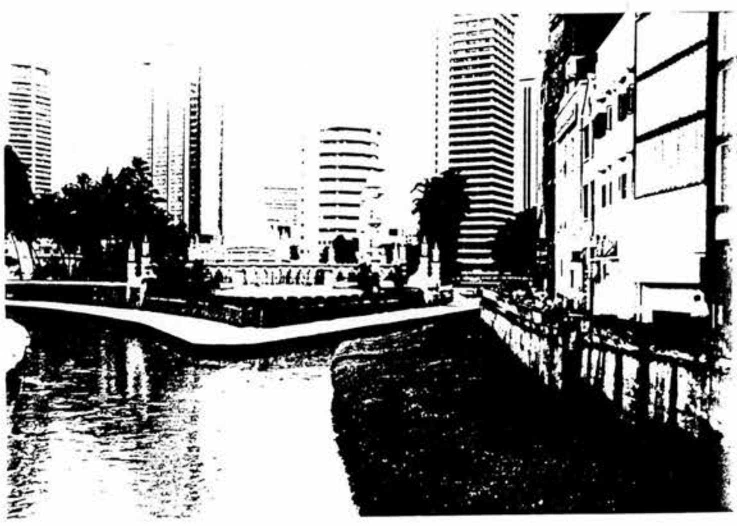


Fig. 2.23: <u>The Demise of an Historical River</u>: "Now for the first time in the long history .....the gaurdians have become the destroyers (Purseglove, J., 1989)

Bukit Nenas that has remained almost untouched since the earliest settlement as may be seen in Chapter 6 is now showing signs of being "modernized". No comprehensive study has been carried out to record the flora and fauna of this unique forest. It would be extremely interesting to find out how they adapt themselves to the highly polluted urban environment surrounding it. Its potential for eco-tourism is tremendous given proper planning and management. Sadly, as will be discussed in detail in Chapter 6, there are now signs that the hill is experiencing pressure due to over enthusiasm on the part of the people responsible for the management of this unique forest. All these unfortunate events have taken place within a strategic urban planning system that is supposed to be an improvement on the previous ad hoc and piece-meal one. Some improvements to the system must therefore seem proper.

Perhaps there is still a glimmer of hope. The City Hall of Kuala Lumpur has recently set up a Conservation and Urban Design Unit with two architects and a planner under its Department of Planning. Led by a very energetic and enthusiastic head, the unit is now screening all applications for development within the area, termed the Central Business District (CBD). The capacity of the unit to cope with the pressure of one of the fastest growing economies in the region and Asia is perhaps in doubt, but the fact that the unit exists at all is an indication that the argument for conservation of this urban heritage has at least at last been heard.

The effectiveness of such a unit can be further enhanced if it has some form of reliable forecasting and monitoring of the overall effect of individual and isolated development on the city. It will also have to be able to speedily find out whether any proposed development impinges upon designated and non-designated landscape resources. In order for it to function positively, it must also be able to direct developer concern towards more suitable alternatives. For it to have these capabilities, the unit needs some form of Geographical Information System (GIS).

NOTES:

1.Quoted by Broadbent, G., (1990), **Emerging Concepts in Urban Space Design**, Van Nostrand Reinhold (International), London, p.217

2.Menick, R.Z. (1985), Introduction: Landscape Architecture and Historic Preservation, in Austin, R.L., Kane, T., Melnick, R.Z., and S. Turner (eds.), (1985), **The Yearbook of Landscape Architecture: Historic Preservation**, Van Nostrand Reinhold Company, New York, p.xi

3.Ibid, p.xi

4.Taylor, K. (1992), **Conservation and Interpretation Study of the Rural Heritage Landscape of the Lanyon-Lambrigg Area, Australia Capital Territory (ACT)**, an unpublished seminar paper presented on a lecture tour of the British universities, Edinburgh, pp. 3-4

5.Op. cit., p.xi

6.English traslation is "Golden Chersonese". See also Linehan, W. (1951), The Identification of some of Ptolemy's Place-Names in the Golden Khersonese, **Journal of the Malayan Branch of the Royal Asiatic Society**, Vol.XXIV, Part 3, pp.86-98. A famous patriotic song, "Bahtera Merdeka" (lyric by Ibu Zain) called the peninsula as "Semenanjung Permata Nilam", which can be literally translated as "Emerald Peninsula".

7.Meilink-Roelofsz (1962), **Asian Trade and European Influences in the Indonesian Archipelago between 1500-1630**, The Hague, p.13. The term "Indonesian Archipelago" used by Meilink-Roelofsz is actually a misnomer as the whole area from the Sumatra Island in the west until the Micronesian Islands of the Pacific in the East is called the Malay Archipelago; Malays (including such groups called the Proto-Malays found in the New Guinea Island and the Micronesia) being the native population of the area and Indonesia is just a country that consists of group of islands that were once Dutch East Indies.

8.No part of the peninsula lies over a hundred miles from the coast.

9.Fisher C.A. (1966), quoted by Lim, H.K. (1978), **The Evolution of the Urban System in Malaya**, Penerbit Universiti Malaya, Kuala Lumpur, p.7

10.Ibid, p.7

11.Op. cit., pp. 86 - 98

12.Parameswara later became a Muslim and took the name of Sultan Iskandar, starting the mass conversion of the Malays from Hinduism to Islam. Accordingly, Malay legend traced the Malay royal line to Pagar Ruyong (Sumatra), subsequently to Iskandar Zulkarnaen of Macedonia (Alexander the Great) - an incredible story indeed. See also Cooper, J. (1984), The Making of Malaysia: A Short History, in **UIA International Architect**, Issue 6/1984, London, p.14

13.Sir Francis Light working for the East India Company in Calcutta, India, took possession of the Island of Penang from the Sultan of Kedah in 1786 and renamed it the Prince of Wales Island. In 1819 Sir Thomas Stamford Raffles took possession of Singapore Island (Tumasik Island) for the British Crown from the Sultan of Johore and after the Neopoleanic War exchanged Bancoolen (an island off the south-western coast of Sumatra) for Malacca with the Dutch. Penang, Singapore and Malacca later became the Strait Settlements. The gradual colonization of the whole of the Malay Peninsula began in 1874. The Selangor Civil War (1866-74) was one of the excuses for direct British intervention.

14.Op. cit., p.14

15.Op. cit., p.93

16.Roff, W.R. (1967) **The Origins of Malay Nationalism**, University of Malaya Press, Kuala Lumpur, pp. 113-125. See also Kohl, D.G. (1984), **Chinese Architecture in the Straits Settlements and Western Malaya: Temples, Kongsis and Houses**, Heinemann Asia, Kuala Lumpur, pp.20-63.

17.Roff, W.R. (1967) reported that as a result of the colonial immigration policy, the population of Selangor and neighbouring Perak grew from 130,000 to 600,000 in 1879 - just 5 years after the British intervention, p.13.

18.The State of Selangor, like any other states on the Peninsula Malaysia during the era just before the arrival of the British, consisted of three major river systems, the Selangor River to the north, the Kelang River in the middle and the Langat River in the south.

19.Lim (1978, p.80) named the local headman concerned as Sultan Puasa. His real name was probably "Sutan Puasa" (see Adil, 1971, p.80). It would be quite improbable for him to have a title of "Sultan" as he was only a local chieftain. "Sutan" was and still is a title given to a Minangkabau Malay male once he assumes the responsibility of leading his tribe. A sizeable population of people from Minangkabau (Sumatra) settled in the area before the advent of British rule. Led by their leader, Sutan Puasa they were involved in the Selangor Civil War (1866-74); first on Raja Mahadi's side then during the second phase of the war switched over to Tunku Kudin's side.

20. Anderson (1824) listed "Sungei Lumpur" as the most important among the the seven tin-producing villages in Kelang Valley. Gullick (1955) said that it was "an intriguing possibility" that Sungei Lumpur was near or on the site of modern Kuala Lumpur".

21.Lim. H.K. (1978), op. cit., p.80. "Pengkalan Lumpur" meant "Muddy Jetty", a reference both to the muddy confluence of Kelang - Gombak Rivers and the "trading post" nature of the settlement. However, when the settlement outgrew its initial "trading post" function, its name must had been changed to reflect the progress. The suffix "Kuala" is a very popular Malay word denoting not only the location of a settlement but also its importance as in the royal towns of Kuala Kangsar (Perak), Kuala Terengganu (Terengganu), and Kuala Lipis (Pahang). The use of the name also denoted a progress from a village which usually have names starting with "Sungai" as in "Sungai Lumpur" (see Endnote no.20). The Chinese name "Ke-Lam-Pur" was probably a corruption of the official name (Lim, p.80).

22.The British rule of a Malay State normally took two steps: at beginning a Sultan was coerced into taking a "British advisor" who would make all the administrative decisions in the name of the Sultan except on matters pertaining to Islam and the Malay customary law and etiquette (normally refered to as "adat"). After a few years, invariably after some simulated incidents, the Sultan would be forced to take in a "British Resident" who could act without first "advising" the Sultan and was able to interpret the "adat". He however, needed to carry out his function in the name of the Sultan. See also Cooper, J. (1984) p.15

23.Op. cit., p.73

24.Tate, M.D.J. (1987), **Kuala Lumpur in Postcards: 1900 - 1930**, Penerbit Fajar Bakti Sdn. Bhd., Petaling Jaya, p.64

25.Ibid, pp.22 - 23

26."Sydney" was the maiden name of Swettenham's wife. The name of the lake was changed to "Tasik Perdana" or "Premier Lake" after the second prime minister in 1974.

27.A police band, made up of mostly Filipino musicians, used to play on a specially erected platform every Thursday afternoon, attracting a lot of spectators, probably starting the culture of family leisure in the park among the locals during the weekends.

28.It was at this conference that the Yam Tuan (Ruler) of Negeri Sembilan was recorded as lamenting the decline in the use of the Malay language for official business. The Sultan of Perak was recorded as pondering the bizzare set-up of the Federated Malay States which he likened to "a ships with four captains" (Tate, 1987, p.66)

29."Carcosa", the seat of the most senior British official in colonial Malaya, had been in its time both the source of mystery and controversy. It was built in 1896. The first resident was Sir Frank Swettenham, the Resident-General of the Federated Malay States. It was probably designed by the enigmatic C.E. Norman, the government architect who was responsible for many other government buildings. In choosing the name of the building, Sir Frank Swettemham was quoted as saying, "I did not call it Government House or King's House because neither seemed an appropriate name in Protected States. I did not give it a Malay name because it was to be the residence of a British Officer, so I took a book name as has often been done before". In the event, he took a name from an obscure novel by an American author, Robert W. Chambers called "<u>The King in Yellow</u>" published in 1895. The building was occupied by a succession of British officers whose title changed with the changes which took place in the British administrative set-up of the Malay Peninsula. During the Japanese Occupation, senior Japanese Army officers occupied the building, followed by their British counterparts during the short duration of British Military Administration, immediately after the war. Lady Newboult, the wife of one of the Chief Secretaries who lived there was completely convinced that the building had a resident ghost. It was granted in perpetuity as a gift to the British on the initiative of the country's first prime minister, Tunku Abdul Rahman and served as the official residence of the British High Commissioner. The gift, however, created political controversy and after renewed agitation in the early 1980s, the Carcosa with its four acre land was officially returned to the nation in 1986. After undergoing extensive renovation and refurbishment, the Carcosa is now an official residence for visiting foreign leaders. (see also Muzzafar D.J. Tate, 1987, p.38).

30.The British Resident, Bloomfield Douglas, moved the capital of Selangor, "lock, stock and barrel" from the riverine town of Kelang (at the mouth of River Kelang) to Kuala Lumpur in 1880 (Tate, 1987, p.23). With undisguised arrogance and minimal respect he took over the running of the town from Yap Ah Loy, the Capitan China appointed by the Sultan, and reduced him to just an ordinary community leader. Prior to that date, the town was ran as almost a private fiefdom of Yap. See also Lim, H.K., pp. 84-85

31."Capitan China" was a highly prestigous post of paramount chief of the Chinese community first created by the Portuguese during their rule of Malacca. The gambling house that Yap Ah Loy built was more of a huge shed with thatched roof and no wall. Incidently this was also a location where he exchanged five silver dollars for every head of his enemy brought to him during the height of Selangor Civil War (1866-74).

32.The two rival Chinese gangs were made up of the Hai San miners led by Yap Ah Loy and the Ghee Hin miners led by Chong Chong. The former was based in Kuala Lumpur and the Ampang mines and the latter was based in the Kanching mines.

33.Quoted from Muhammad, Z. (1993) at the Senior Planning Officer Conference (9 June, 1993). Muhammad is only the fourth Malaysian to hold the post of Director-General, Federal Department of Town and Country Planning Malaysia.

34.Jackson, J.C. (1963), Kuala Lumpur in 1880's: the Contribution of Bloomfield Douglas, **Journal of Southeast Asian History**, Vol. 4, No.2, p.123.

35.Ibid, p.123

36.Gullick, J.M. (1955), Kuala Lumpur; 1880 - 1895, **Journal of the Malayan Branch of the Royal Asiatic Society**, Vol. 28, p. 40

37.One of the most popular transportation mode at that time was the jinkricksaw. It was a two wheeled vehicle pulled by coolies - young, old, muscular, skinny, in baggy shorts, a tattered shirt or no shirt at all - a thin gnarled body between two great shafts - pulling the weight of a tuan or his mem. For the newly arrived Westerner with an ounce of sensitivity not yet blunted by the colonial nexus it looked like "The master was on the throne. The slave was in harness". Tate recorded a reminiscence of a new expartriate (George Bliankin) when he first took the transport as "His shoulders moved in rhythmic action ..... I half shut and then opened my eyes and saw the perspiration on the man's vest. It was I who caused the perspiration".

38.Gullick, J.M. (1955), Ibid, p.199

39.Courtney, P.P. (1972:251), quoted by Lim, H.K. (1978) op. cit. p.91

40.**Kongsi** Hall is a Community Centre.

41.Tate, M.D.J.(1987), op. cit., p.14

42.Historians such as Tate (1984, p.84) and Lim (1978) recorded the terrible injustice done to these peoples, especially those in the rubber and coffee plantations. Their wages were miserly and living conditions were deplorable. Those who could afford to buy back their contract and pay their own fares, returned to India, while many others were forced into prostitution to supplement their income. Those that were brought to work in urban-based jobs such as railway, commerce or brick-making were a little bit more lucky, as some of them did become wealthy.

43.Thambusamy Pillai, a rich Indian philantropist was one of the major finacial sponsor of the temple's construction (Tate, 1987).

44.The term "kampong bahru" can be literally translated as "new village" which is a normal name given to a settlement before it is given a proper name. It indicates temporary nature of either the name or the settlement itself. Perhaps in this case it was an indication of the villagers intention of recovering their lost ground or their anticipation of moving further away from the area as some of them finally did.

45.Roff, W.R., (1967), **The Origin of Malay Nationalism**, University of Malaya Press p.125.

46.Now called Bukit Aman

47.Now called Sultan Abdul Samad Building. The sultan was the ruler of Selangor when the building was constructed.

48."Padang" is a Malay word meaning "Field".

49."Laman" is Malay word for "compound" of a building, normally house.

50.Despite its name, when the Sultan was invited by the board of club trustee to be the patron, a pandemonium broke out at the meeting. Even the richest of Asians personalities such as Thambusamy Pillai, Raja Bot, and Loke Yew had to be satisfied with being just associate members (Tate, 1987, p.56). The Spotted Dog was the scene of such high spots in Kuala Lumpur's social calender then as the St. George's Night Ball when, to the strains of "The Roast Beef of Olde England", beefeaters from the Royal Society of St. George carried dishes of roast beef onto a dance floor surrounded by enormous blocks of ice - with frozen roses inside. Perhaps its greatest moments was the occasion of the Prince of Wales' visit in 1922, when he was said to have greatly upset the senior mems by dancing all night with a particularly attractive Ceylonese Eurasian. See Allen, C. (ed.) (1983), **Tales From the South China Seas**, British Broadcasting Corporation, London, p.59

51.Tuan and mem are Malay words for "master" and "madam" respectively.

52.This was one of the several theories had been forwarded for the name and was the most accepted. As for the mock-Tudor architecture, it was the nearest one could get to be at home.

53.Hargreave was probably either a high ranking board official. As to whether he was the same man as one of the first headmaster of Kuala Kangsar Malay College (MCKK), an English-medium school set up by the British to train the children of the local Malay elites for junior posts in the colonial administration, is still a speculation (See also Roff, W.R., 1967)

54."Dataran" is a Malay word for "raised platform" and "Merdeka" means "Independence".

55.In the event, two men were convicted of trying to sabotage a public project. The underground car park and shopping arcade are now complete failures. They have become favourite haunts for louts and drug addicts.

56.The restaurant served cheap lunch for workers from the numerous offices around the open space and the Padang.

57.Before the advent of paper in the Malay world, the fronds of <u>Borassus flabillefer</u> used to serve as writing surfaces.

58.Bundung (<u>Cyperus polystachyus</u>) used to be a very important material for mat and ropes.

59. The fact that the statue was commissioned and installed when he was still alive and well, though in retirement in England, showed the high regard the colonial administration gave to his role in the development of modern Malaya.

60.Maugham, W.S. (1951), **<u>The World Over: The Collected Stories</u>**, Vol.2, The Reprint Society London, p.1326 -1355. See also Tate, 1987, op. cit., p.62

61.Incidently Mr. Proudlock was a headmaster at the Victoria Institution, adding colour to the history of the school.

62.When the university moved to its main campus in Skudai, Johore, the Gurney Road campus was retained as a branch campus. The author is a proud first graduate of the Faculty of Built Environment of the university in 1978 and after successfully completing an MPhil. in Landscape Architecture at Edinburgh University (1980-82) was given the task of planning and implementing the landscape development of the 3000 acre new campus (1982-89).

63.The term "Sakai" which means the "Uncivilized One", has been changed to "Orang Asli" (the Original People) by the government after Independence. When the encirclement of the hills was completed in the early 1960s, the government decided to move the services to a new and much better Aboriginal Centre at the 9th Mile Gombak Road.

64.Frederick Weld was titled Colonial Inspector of Land and Mines. He was responsible for the administration of land, mines and forestry.

65.Ahmad, W.Y.W. (1991), a personal friend and a forester with the Department of Forestry, Malaysia, kindly helped in a one-day visit to identify major plant species within the forest reserve. Information was also derived for this part of the report from the ad hoc studies done by Forestry Research Institute of Malaysia (FRIM), Kepong, Faculty of Forestry, Agriculture University of Malaysia (UPM), Serdang and Annual Reports of Forestry Department, Malaysia.

66.Department of Forestry Malaysia (1984), Annual Report, Kuala Lumpur, p.197. Mentions were also made in the 1968, 1978, 1986 annual reports.

67.Silver Wattle (Acacia cicinata) and its cousin the Common Wattle (Acacia auriculoformis) are not native to the Malay Peninsula. They are believed to be from the north-eastern Australia. Brought by the planters as shade trees in the early 60s, these gregarious trees are now to be found in all areas which are bare.

68.Kancil or Malay Mousedeer (Tragulus kanchil) is a very popular character in Malay fables. Called "Sang Kancil", it is projected to be the most intelligent animals; outwitting not only big canivorous animals like the tiger, python and crocodiles, but also some sleazy human characters such as greedy landlords. It personifies the Malays'philosophy of the weak and humble eventually conquering the greedy and wicked.

69.Allen, C. (ed.) (1983), **Tales from the South China Seas: Images of the British in South-east Asia in the Twentieth Century**, British Broadcasting Corporation, London, p.157

70.Ibid, p.231

71.The Malay girls went to village schools where only Malay and a little Arabic were taught. They would invariably stop schooling once they were able to help in the rice fields (around 8 years old). The school is now open to girls from all races.

72.The other two were Victoria Institution (VI) and Methodist Boys School (MBS). Before they were moved to the salubrious surrounding of Petaling Hills, both these schools occupied premises along the High Street.

73.Because of its secular education policy, only the Victoria Institution (VI) and a few other English schools took in Malay boys but only they were of "good birth", meaning sons of Malay aristocrats (Roff, 1980, p.24).

74.The sultan referred to was probably Sultan Mansor Shah, as he was the only one known to have married a Chinese princess, Hang Li Po; a marriage made out of diplomatic policy of sealing the Chinese Emperor's friendship with the various other states as recorded in the travelog of Marco Polo. It was also known from recorded history, the "Sejarah Melayu", probably written by Tun Sri Lanang, a court official, that Hang Li Po was delivered by the famous Chinese Muslim admiral, Cheng Ho, to the court of Malacca. It was probably on this trip that Cheng Ho was recorded in his own travelog, to have visited the Selangor Delta.

75.Adil, B. (1971), **Sejarah Selangor**, Dewan Bahasa dan Pustaka, Kuala Lumpur, p. 14. The Bugis are the people of a sub-Malay group that originate from Suluwesi Island (formerly Celebes

Island) off the eastern coast of Borneo Island. They were seafaring people. They became a very strong regional power in about the 18th Century gradually taking over from the Johor Empire, that was weakened by intermittent war with the Achinese (Northern Sumatra). They set up their base in Riau which became the most important regional port before the arrival of the Dutch. Under the leadership of Daing Kemboja Daing Perani and the charismatic and pious Raja Haji, they fought and won many battles against the the Dutch until the latter was fatally wounded in a battle of Teluk Ketapang. It was after the disintegration of the Johore Empire because of manouverings by the Dutch who were seeking monopolistic trade in tin, opium and spices in the South-east Asia region, that Raja Lumu was enthroned as Sultan Sallehudin of Selangor in 1756, encompassing the three main river systems of Selangor, Kelang and Langat (Appendix 3). See also Khoo, K.K. (1992), Riwayat Negeri Selangor Darul Ehsan, in Nawang, A.H. and M.F. Othmans (eds.) (1992), **Selangor, Sejarah dan Proses Pembangunannya**, United Selangor Press Sdn. Bhd., Kuala Lumpur, p.38

76.The Selangor Civil War was fought between two groups of Selangor nobles led by Raja Mahadi on one side and Raja Abdullah on the other. The first round was won by Raja Mahadi by literally starving his enemies. However when Raja Mahadi became arrogant and refused to pay taxes to Sultan Abdul Samad, who had remained aloof of the situation, the sultan broke off Raja Mahadi's engagement to his daughter and married her instead to Tunku Dhiauddin (popularly known as Tunku Kudin), the younger brother of Sultan Tajuddin Shah of Kedah. Tunku Kudin was given the command of the Sultan's faction against Raja Mahadi. It was Tunku Kudin who invited the British to intervene on his side and thus remembered in the Malaysian history as the man most responsible for the eventual colonization of the Malay Peninsula.

77.This is a very old Malay form of building retaining wall. Bakau (Aviciena sp.) poles were found to be water resistance and last very long indeed. In fact most of the modern piling work in Malaysia is done using "bakau" poles, creating an industry out of mangrove swamp where the "bakau" grows profusely. The rate of construction work in the country has created alarm because of the rate of loss of mangrove swamp which is found to be a very important breeding ground for fish and crustaceans.

78.The Chief Minister of Selangor at the time when the permission was given to the Chartered Bank to extend their premise over the area was later convicted of corruption charges related to this case.

79."Pudu Cut" drain is a local term to describe a drain where not only the bank but the base is also made up of cement-mortared granite lumps. It is quite similar to a rip-rap.

80.When the bank building was planned and designed the chairman of the bank was a Kelantan prince who later became Malaysia's Finance Minister. It was no coincidence that this over-sized Kelantan House was designed according to his wish.

81.In 1991, the maintainance of the 30 feet-length "wall" created a rift between the bank and the City Hall. It was later decided that the bank would maintain the "wall" but assume no responsibility for its future preservation.

82.The Malays referred to this hotel as a "high class bordello". It was the normal policy during that time that expatriates were not allowed to marry during the first three years of their contract in the Malaya. See Allen, C. (ed), 1983.

83.Chadwick, G. (1971), **System View of Planning**, Pergamon, Oxford, p. 63

84.Chapin, F.S. and E.J. Kaiser (1979), **Land Use Planning** (3rd Edition), University of Illinois Press, Urbana, p. 23

85.Bruton, M. and D. Nicolson, **Local Planning in Practice**, Hutchinson, London, p.52

86.Until recently, it was a practice to rename all the streets and roads with colonial names with names of local heroes and dignitaries. Thus Rodger Street was renamed Hang Kasturi Street, etc. The Prime Minister, Dr. Mahathir Muhammad, was quoted when he launched the "Visit Malaysia Year, 1990" at Putra World Trade Centre, Jan., 1990.

87.Rahman, A.A. (1990), **Conserving Old Shophouses in Kuala Lumpur, Malaysia**, MSc in Architectural Conservation Dissertation (Unpublished), Heriot-Watt University/Edinburgh College of Art, p.4

88.Dewan Bandaraya Kuala Lumpur, (1984) **Kuala Lumpur Structure Plan**, Kuala Lumpur, p. 181

89.Purseglove, J. (1989), **Taming the Flood**, Oxford University Press, Oxford, pp. 7 and 17.

CHAPTER 3

URBAN PLANNING SYSTEMS IN MALAYSIA AND THE NEED FOR AN INFORMATION SYSTEM

INTRODUCTION

Since she achieved independence in 1957, Malaysia has experienced prodigious development. This is partly the result of pragmatism and the ability of the planners to read the underlying trend of socio-economic changes both internally and externally. Relative social and political stability have underlain this development and 3 stages in it may be discerned:[1] The first stage characterised by an emphasis on social upliftment in terms of literacy and education, health and infrastructure, the second stage with an emphasis upon correcting regional imbalance, economic disparity and rural-urban migration, and the third stage marked by the nation's expansion into the world economy and the tackling of growing problems brought about by the increasing urbanisation of the population.

The traditional role of planning as a mechanism for controlling spatial development is increasingly being put under scrutiny. In response it has become more aggressive as an instigator of change. The aim of this chapter is to examine the nature of the planning system in Malaysia and to compare it with the theoretical requirements of the "spirit and purpose of planning" (Bruton, 1984).[2] It also aims to provide a framework for discussion of the need to integrate environmental and landscape planning within the mainstream urban planning processes and practices.

THEORETICAL FRAMEWORK OF URBAN PLANNING SYSTEM

It is apparent that urbanisation problems are the main concerns of current town planning objectives (and to a large extent, the national planning objectives too) in Malaysia (Yaakub, 1992).[3] Urban planning activities are tied up within the framework of the successive five-year national development plans, known officially as Malaysia Plans, which themselves are further controlled by long term strategic planning, for example, the New Economic Policy (1971-90) and the current New Development Policy (1991-2020). Therefore, these activities are part of an overall plan very much in line with what Diamond (1979) observed as: "each level of planning forms a strategic function for the level below and conversely is constrained by the strategic planning of the level above".[4]

Bruton (1984) further emphasised the point by contending that "in an idealized situation at the top of the hierarchy (national level) plans and policies for, among other things, social and economic changes are formulated. These plans and policies in turn constrain more detailed but still general plans and policies for socio-economic change, for example at regional level. At this level of detail the physical land use implications of the policies may well be set out in the form of a broad concept plan or strategy for physical development associated with the desired socio-economic change".[5]

The Town Planning Institute of the United Kingdom in 1976 adopted a definition of town planning as "a process, involving a recurring cycle of operations, for preparing and controlling the implementation of plans for the changing systems of land use and settlement of varying scale".[6] And Chadwick (1971) defined planning as "a process of human forethought and action based upon that forethought".[7] He then drew a similarity in the planning process to that of the method of analogy (Acknoff, 1962). Thus he concluded that "planning is a conceptual general system". Accordingly he observed that "by creating a conceptual system independent of, but corresponding to, the real world system, we can seek to understand the phenomena of the process and change, then to anticipate them, and finally to evaluate them; to concern ourselves with the optimization of the real world system by seeking optimisation of the conceptual system".[8] It is interesting to note that Chadwick put "Landscape Design" within this general system theory, as a sub-system of physical planning (Fig. 3.1). He indicated by "Landscape Design", "optimization of major man-nature sub-systems (perceptual and physical)". As Urban Planning too is within the ambit of physical planning, it can only be concluded that both Landscape Design and Urban Planning are concerned with optimization of the relationship between man and nature. In the real world this relationship translates into decisions presumably taken by planners in the management of land-based or landscape resources on behalf of man. In other words, both are aiming for the "best" management of landscape resources.

The establishment of the above relationship requires that the planners understand the system involved before a plan is drawn. As McLoughlin (1969) stressed, "the preparation of alternative plans must be based on an understanding of how the urban system works, how it might evolve, how it develops if left alone, and how it would react to different policies".[9] Invariably the activity of planning is more than producing plans and controlling development in accordance with these plans. The planning task embraces policy making and implementation which has significant bearing on the spatial distribution of investment and the development and use of land and resources at all scales.

Urban planning is basically an exercise of trying to pre-empt the course of events in the development of an urban area in a manner that is thought to be the best option available. However, the finite result of the exercise in term of socio-economic changes may take a long time to materialise. The same is equally true in simpler physical planning except that the time-lag may be much shorter. The issues that are to be addressed by the

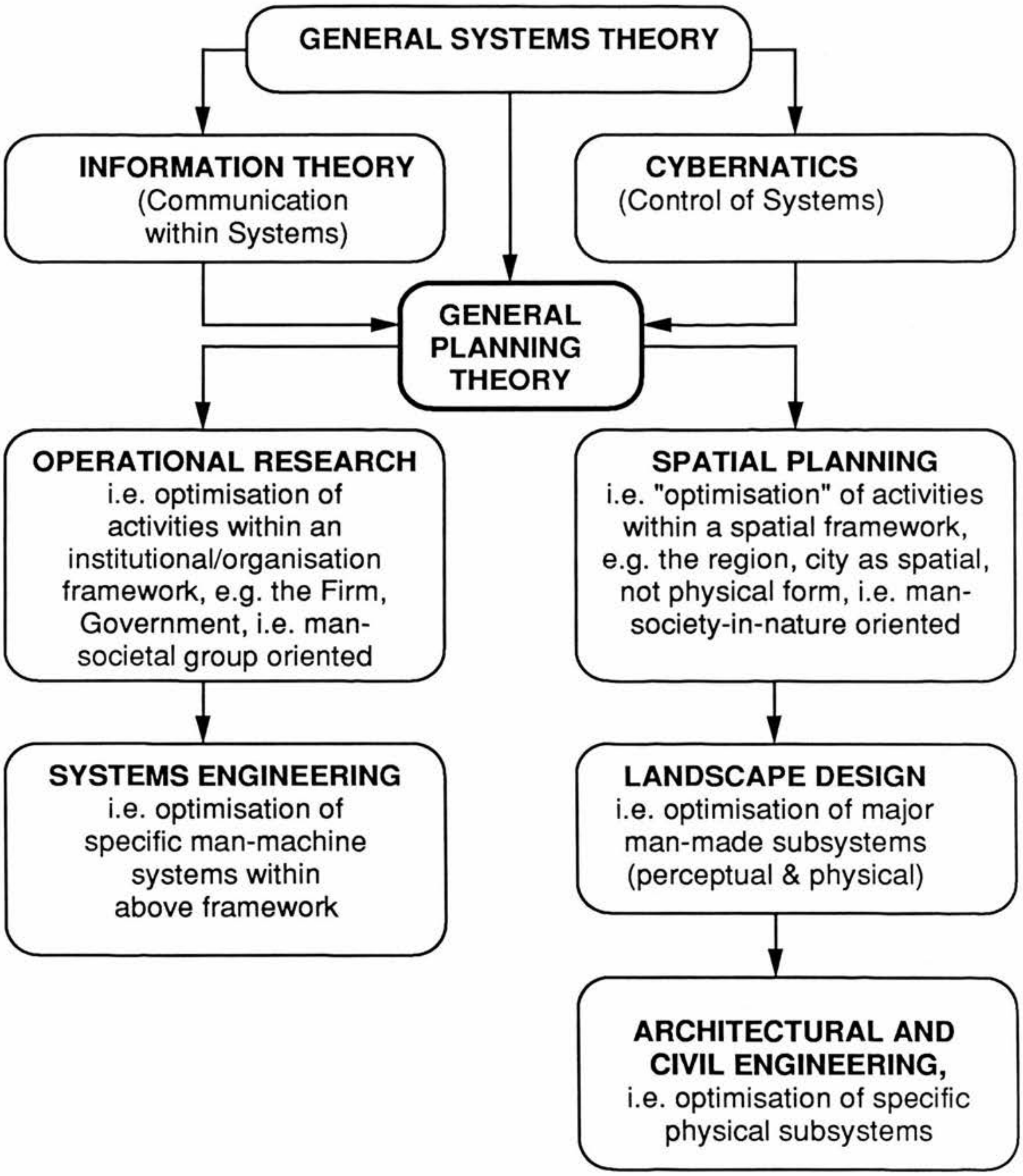


Fig. 3.1: **A Conceptual System Basis for Urban and Regional Planning:**
Landscape Design is shown as part of spatial planning. The understanding of man-nature relationship is critical to a successful spatial planning
(Source: Chadwick, G., 1971)

exercise tend to be very complex (Pahl, 1970). In the case of Kuala Lumpur, urban degradation of its old town may seems to be just an issue of neglect by uncaring owners and tenants. A little investigation however shows that a host of other problems are related to the issue. Among these are political climate, disincentives for conservation and preservation activities as a result of the enforcement of the Rent Control Act, 1948, changes in the mode of transportation and shopping preferences.

Many of the above problems have direct bearing on the welfare of the existing urban landscape resources. In the words of Mason and Mitroff (1981), "... every real world policy problem is related to every other real world problem and planning problems are no exception". It is vital therefore that in attempting to solve a particular problem, a planner realises that he has to address a host of other related problems; some may be classed as causes while others are the effects. Policy-makers are slow to realise that policies formulated to solve one problem may have unintended consequences and create problems in other areas (Bruton and Nicolson, 1987). The effectiveness of policy will only be improved given the means of assessing all the possible consequences of all the options that are open.

Like their counterparts elsewhere, Malaysian urban planners are not dealing with simple problems, or problems of disorganized complexity. They are faced daily with problems of organized complexity - problems which Rittel and Webber (1973) referred to as "wicked problems". These problems are not "wicked" because they are evil. Rather they are "wicked" in that the more one attempts to solve them the more complicated they become (Bruton and Nicolson, 1987). For example, the Rent Control Act, 1948 was adopted in Kuala Lumpur and other cities to control the spiralling rent of pre-World War II shopping premises in order to ensure the survival of small traders. It has resulted in hundreds of shophouses in the old town centre being left to decay by their owners because of strict regulations pertaining to rent fixing and eviction of tenants. Shophouses that are decaying and dilapidated do not serve well as shophouses, so the tenants turned them into godowns and other illegal uses, resulting in traffic problems when loading and unloading activities are carried out. Most of all this leads to further dilapidation which eventually forces the authority to approve their replacement with new and more up-market shopping complexes, thus further degrading the historic and traditional character of the area. On the other hand, lifting of the Rent Control Act, 1948 completely as is being contemplated by the government may result in the demolition of hundreds of buildings that are part of the national cultural heritage and the losses of thousands of jobs and shelters (Koneik, A., 1991).[10]

Urban problems are related in a complex entanglement. The implication of such a situation is that urban planners working at local level and seeking to function as managers of change are always faced with uncertainties. This contradicts the traditional assumption in planning practice that both the goals (or ends) of planning and means of achieving those goals are known and accepted; that is, the change being sought and the methods of bringing that change about are certain (Christensen, 1985). In reality, the situation is much more complex.[11] Thus Chadwick said that "planning is initially concerned with the conceptual framework which allows the necessary process of regulation of variety". He emphasises that planning activitiy must be seen as dependent upon the application of scientific method to the problems of the real world. In this endeavour, the insight provided by the general systems theory, information theory and cybernetics are all inter-related.[12]

Only by looking at the real world as a system of systems, an order is introduced which constrains variety (problems and/or solutions) through studying only certain systems. At the same time by defining those systems through the medium of modelling, variety is further constrained. Thus by modelling a conceptual system of the real world, it is argued that it is possible to first understand the process of change; second to anticipate and evaluate those processes, that is, the high variety of the real world is reduced to a conceptual system where the level of variety is capable of comprehension through the deliberate process of modelling. When it is desired to return to the real world in an attempt to anticipate and control the outcome of "wicked problems", so the level of variety is increased to meet the circumstances of control.[13]

Recognition of the nature of planning issues, requires a systematic approach to development planning. The adoption of strategic planning as currently practised both in Malaysia and the United Kingdom gives hierarchial structure and order. However, at every level of the heirarchy, there are bound to be uncertainties and complexity. These are generally referred to as contingencies. While still operating within the overall context of an adopted higher-level strategic plan, the planners may therefore adopt a view of local issues as meriting local emphasis and uniqueness, both in the appraisal of problems as well as in their solution. This approach is called the contingency approach.

The contingency approach does not attempt to provide a code of universal principles which are applicable to most situations. Rather it argues that the "right" approach to adopt in any situation will be contingent upon the specific conditions and circumstances within which decisions are made and implemented. Methods and approaches appropriate in one situation will not necessarily be appropriate in another situation. Newstrom, Reif and Monczka (1975) summarized the approach ".... takes the position that theory acquires value only to the extent that it is successful in application and that theory must be adaptable to the needs and realities of the practitioner. It acknowledges that there are few universal principles that apply equally well in all situations. Instead, it emphasizes the conceptual framework, thought processes, and diagnostic and analytical skills that will enable managers to set objectives and develop the most appropriate means for achieving those objectives within the given situation".[14]

Agreeing with this view, Christensen (1985) advocates the adoption of a contingency approach to planning on the ground that "planning processes can be understood as contingent because they are not pre-determined, but depend instead on problem conditions".[15] She further emphasizes this point by saying "....that the planning process can be understood as addressing different conditions of uncertainty. Thus planners must assess the actual conditions of uncertainty that characterize the particular problem they are confronting and then select a style of planning that suits those conditions. By tailoring planning to real world conditions, the planner is acting contingently. In doing so, the planner copes rationally with uncertainty".[16]

Pragmatic as this approach may seem, there are potential hazards in wholesale adoption of this approach. Most significantly the objective underpinning the overall strategy may be lost in the concern to adapt to complex and dynamic contingent factors at the tactical or local level. Furthermore, this will transform any planning exercise purely to that of problem-solving. Bruton and Nicolson (1987) suggested that the contingent approach be set within the overall strategic framework so that the overall plan has flexibility to cater for contingencies, especially at local level. Accordingly, they suggested an idealized framework for strategic planning and its implementation in the public sector (Fig 3.2).

In this idealized conceptual framework, the heirarchy of decision-making becomes clearer to the urban planners

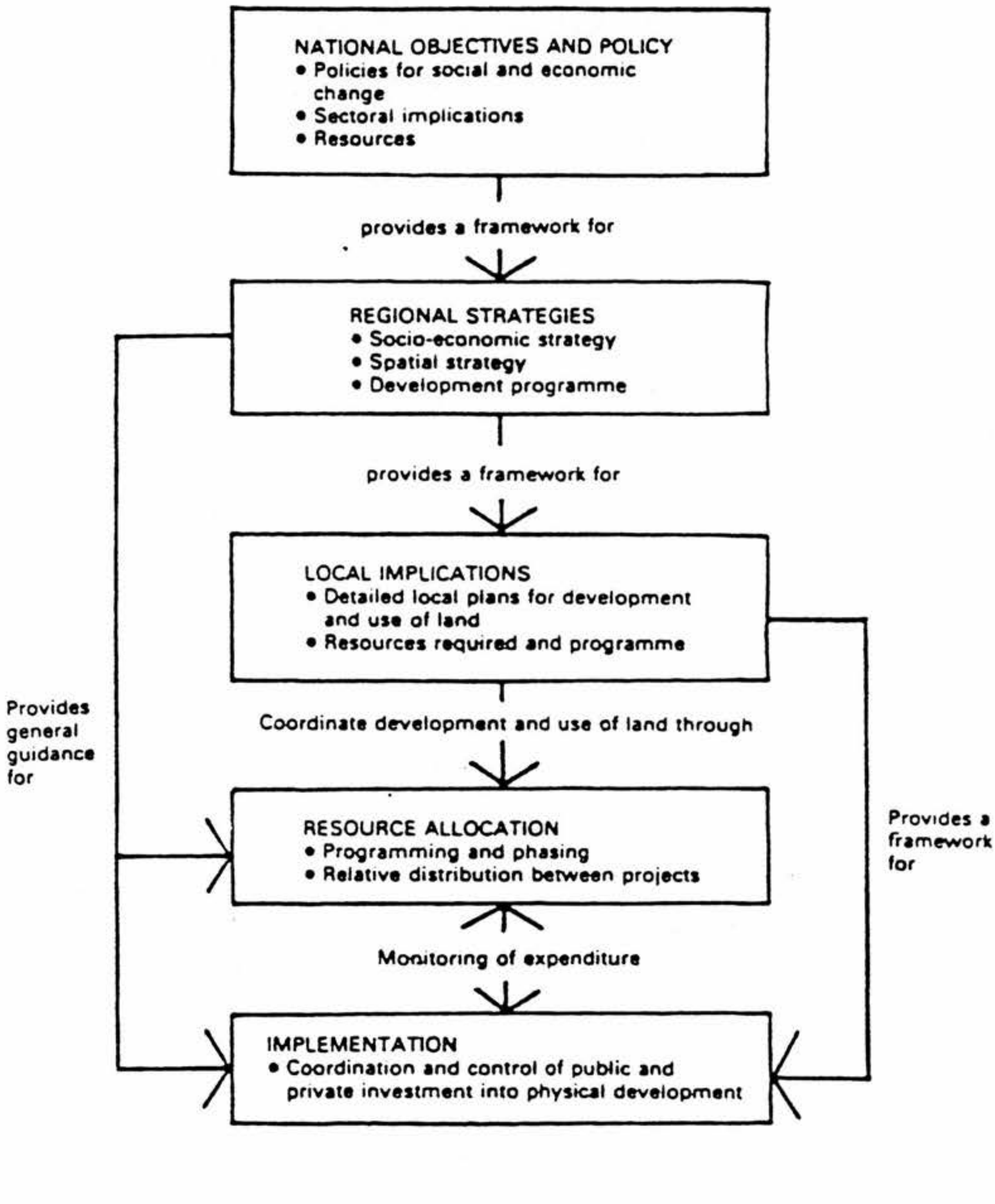


Fig. 3.2: __An Idealized Framework for Strategic Planning__: It is important that while general objectives are kept, some flexibility is allowed to cater for contengencies and local peculiarities at the local levels.
(Source: Bruton, M.J. and D.J. Nicolson, 1987)

involved. While the local plan has to address certain local contingencies that may crop up from time to time, it also has the flexibility allowed by the system. This is for as long as the main objective of the plan higher in the hierarchy, namely, the structure plan allows it. Because the structure plan itself is working within the framework of the national plan, therefore, any action being taken within the limit of flexibility allowed at the local level, is in conformity with the national plan.

STRATEGIC PLANNING IN MALAYSIA

In order to understand some of the major problems being faced by Malaysian urban planners in relation to landscape resource management, a discussion on the evolution of development planning in the country may be helpful. The one appreciated legacy the British left was a well-established public administrative system. This included an urban planning system, which by extension, had its origin in the Housing and Sanitary Acts in the late 1890s. The first urban planning regulation was popularly known as the F.M.S Cap.137, Town Board Enactment, 1935.[17] This enactment which had "planning control" as its main objective, was based on land use zoning. Later on, residential density zoning was added to the "tools of control". Using this legal instrument, maps known as "Comprehensive Development Plans" were drawn up for most of the major towns in the country. Normally these consisted of three maps: Land Use Zoning, Residential Density Zoning and Central Area Development Plan, which might have sub-zoning and plot area ratio allocation. No written statement accompanied these plans, leaving wide powers of interpretation in the hand of the planning authorities and their staff.

Being the first town to be accorded a local authority status, Kuala Lumpur had a relatively long history of association with urban planning. The first plan purposely prepared for Kuala Lumpur was the Kuala Lumpur Zoning Plan of 1931. This was superceded by its first Town Plan of 1939. The Town Plan was amended when the municipal boundary was extended. At the directive of the then Minister of Local Government and Housing, the Town Plan was replaced in 1965 by a new master plan which consisted of Central Area Development Plan (Plan No.L886), Residential Density Zoning Plan (Plan No.L887), and Land Use Zoning Plan (Plan No.L888). These plans were renamed and renumbered with minor adjustment in 1970 and were drawn up in accordance with the mentioned Part IX of the F.M.S. Cap. 137.[18]

The City of Kuala Lumpur (Planning) Act, 1973 (Act 107) was adopted after Kuala Lumpur was declared a Federal Territory with an enlarged area of 150 sq. kilometres in 1972.[19] This act of parliament replaced the Executive Committee of the State of Selangor with the Mayor, in his capacity as the Commissioner, as the approving authority for any development within the territory. As this law adopted all the existing plans wholesale, the additional areas were left without any legal planning control documents. Subsequently, a piece-meal approach was adopted for the additional areas.

Malaysia adopted the British Development Plan system in 1976; only a decade after it was adopted in the United Kingdom. Because there was not enough local adaptation of it, several problems were then experienced. Some of these, would be illustrated in greater detail in Chapters 5 and 6, and were directly related to the management of the urban landscape resources.

One of the major problems was reflected in the response to the continuing rural-urban migration. The Japanese Occupation (1942-45), the Communist Insurgency (1945-60), the struggle for independence (1945-57) and the increased economic imbalance in favour of urban areas in the early years of independence all contributed to a great movement of the rural population to the cities in the 1960s-70s.[20] This led to the first mass contact of people who had been by-and-large previously segregated along ethnic lines. The result was socio-economic chaos culminating in the infamous 13th May, 1969 racial riot.[21] The apparent racial harmony derived from the actively cultivated colonial policy of socio-economic ignorance of the native population proved to be very slight indeed (Roff, 1967).[22]

The government attempted to address the problem by adopting a long term policy plan called the New Economic Policy (NEP).[23] This led to greater numbers of rural Malays becoming urbanised. As the rural immigrants were generally poorly educated or with no formal education at all, they tended to be employed in lowly paid jobs forcing them to illegally occupy vacant lands close to their place of work, thus adding to the problems of already high incidence of Chinese and Indians squatter settlements in the urban areas. The immigrants-turned-squatters were occupying every available space they could find, although for tactical reasons government-owned lands were preferred (Yaakub, 1992).[24] One result of these activities was an unrelenting pressure on urban landscape resources such as former tin mining lands and vacant areas such as river and utilities reserves.

The adoption of the New Development Policy (NDP) in 1991 was aimed at building upon the success of the earlier New Economic Policy (1970-90) especially in implementing a coherent urban development strategy. Accordingly, since 1974, the philosophy and practice of town and regional planning in Malaysia has been reviewed to take into account the dramatic changes in the country's strategic planning systems.

As a result of a parliamentary review, popularly known as the Athi Nahathan Commission Report, 1974, the role of urban planning in the country was reformed through the adoption of twin acts of parliament. These were the Local Government Act, 1976 (Act 171) and the Town and Country

Planning Act, 1976 (Act 172). The first act required the country be divided into various local authorities: City Councils which were to administer big cities such as Kuala Lumpur and Ipoh; Municipal Councils for big towns such as the state capitals; and district councils responsible basically for rural districts. For the first time, urban planning activities were not limited to the passive role of development control within the boundary of a town board. The second act gave urban planning the role of "planning", that is, charting the growth and development of the country, and enhancing its role as a custodian of the urban environment.

Under the Town and Country Planning Act, 1976 (Act 172), every municipality or district council must prepare a development plan. This development plan consists of two important parts: the structure plan and the local plan. While the structure plan is strategic in nature, the local plan is interpretive. Thus, while the former is concerned with medium term (15 years) goals of development, the latter is solely to interpret and implement the policies adopted in an area of relatively manageable size with similar development problems, issues or targets. Because of its complexity as the national capital, when the Town and Country Planning Act, 1976 was adopted, Kuala Lumpur was specifically left out. Planning activities in the city continued to be guided by the City of Kuala Lumpur (Planning) Act 1973 or Act 107.

In 1980, the minister-in-charge of Federal Territory asked that a masterplan be prepared for the national capital. In the course of this work, it was found that a strategic planning system, much like the one produced by the Town and Country Planning Act, 1976, was better placed in guiding the development of the city than a static and target orientated master planning system. The Federal Territory (Planning) Act, 1982 (Act 267) was therefore rushed through the parliament to legalise a planning activity that was almost completed. This was bound to produce several significant differences with the process and products of the earlier acts of parliament. The most significant of these was that many of the products of the process were classified "confidential". These included the Sectoral Reports (Technical Reports), the Report of Survey and the Implementation Plan which if prepared under the earlier act would have been open for public scrutiny. In the end, the public was presented with a fait accompli structure plan. They were effectively presented with high sounding, general written statements and difficult to understand diagrams for which they were told to take the planners' words that they had been prepared with all due care in their accuracy and comprehensiveness of information and data. Despite the requirement of the Act, the plan had been implemented without any local plans being adopted. The tools of implementation were and are a series of ad hoc and draft local plans and studies. As a result, there were glaring divergences from the prepared structure plan in the city's development.[25] All this led to the question whether the plan had been prepared with the best or any data and information available and whether it was capable of adapting to regular review not only as required by the law but also by the dynamic nature of strategic planning.

Since the early 1980s there was an important parallel development. An increasingly educated and sophisticated population were becoming more aware of the need for environmental control and conservation of its socio-cultural heritage. In 1985, under increasing public pressure, the government amended the Environmental Quality Act, 1974 to the Environmental Quality (Amendment) Act, 1985 aiming to give better protection to the environment while at the same time prodding it along a more environment-friendly path. However, although the act strengthened the power of the previous urban plannning law by requiring the preparation of an Environmental Impact

Statement (EIS), there were fundamental flaws that made it less effective. Firstly, planning agencies were not directly responsible for its implementation. As most planning agencies were under the Ministry of Housing and Local Government rather than the Ministry of Science, Technology and Environment, the procedure for planning approval, rejection or appeal against or for a project were long winded and unnecessarily complex.[26] Secondly, the exemption of certain development by size rather than types meant that most of urban developments were effectively outside the power of the regulation (Chin, 1993).[27] Thirdly, while the absence of an integrated environmental database made it impossible for the authority to identify suitable sites for certain types of development it curtailed their ability to verify the data and recommendations of the consultants who made submissions on behalf of their paying clients (Nor, 1990).[28]

Because of its relatively long urban history, Kuala Lumpur faces an accumulation of environmental problems. The problems range from air pollution typically associated with a motorised society, to river pollution created by urban effluvia and "accidental" spillage from mining activities upstream to urban sprawl and created by uncontrolled and illegal residential and industrial developments. These choatic situations were meant to be addressed by the Kuala Lumpur Structure Plan, 1984.

THE NEED FOR AN INFORMATION SYSTEM FOR URBAN LANDSCAPE RESOURCE PLANNING WITHIN THE MALAYSIAN URBAN PLANNING SYSTEM

The effectiveness of an urban planning system, especially in relation to the management of urban landscape resources, can be improved by the use of a suitable information system. A high percentage of normal daily tasks of planning are planning control by nature and thus involve ad hoc decision-makings. These require accurate and current spatial data. In fact as Horwood, E. (1980) said "....to be credible, planning must be cast in an information system context".[29] Cook, D. (1980) was quoted by Cowen, D.J. and W.L. Shirley (1991) as saying "urban and regional planning is a data business. The nature of data distinguishes planning from other data business because virtually all planning data is intimately related to geography or spatial location".[30]

According to Meyerson (1956) there are 5 basic functions of planning: central intelligence, pulse taking, policy clarification, detailed development planning and feedback and review.[31] The first serves to obtain relevant information. The information may come from a wide variety of sources. Other than the need to assemble different data at the same time, there is also a need to change the data into various mixes. For example, a planning exercise may involve a selection of information on the quality of buildings according to age, at the same time it might also be interested in the specific type of building use and building ownership, and building facade type. A GIS should be able to give this information in a very short time in both statistical table form and in graphic form and handle large amounts of this information fluently.

In Malaysia, planning traditionally has put less emphasis on the physiological aspects of land and more on technical aspects such as access, land ownership, and plot ratio requirement. This function, therefore, is critical to urban landscape resources. A system which allows potrayal and presentation of the various aspects (or capability) of a piece of land such as its resources will definitely improve planning consideration.

The second function of planning, pulse taking, serves as a form of early warning. This activity often requires an in-depth analysis of existing conditions and changing situations. In order to do this, the planner must be able to convert data into meaningful patterns and trends.

Monitoring development within a highly built-up Kuala Lumpur Old Town will be seen as an example of this function (Chapter 6) and is also important in anticipating development pressure on certain resources because of development taking place surrounding it. This will be seen in the case of Bukit Nenas Forest Reserve (Chapter 6). An effective GIS well served by adequate data should be able to highlight the patterns and trends of such development in order that the planner is aware of the full impact of the development in relation to a set of established objectives and can act accordingly.

The third function of planning, policy clarification, is the understanding of the implications of policy alternatives and recommending those alternatives most likely to achieve set goals. In a local planning context, this function is extremely useful in understanding the full impact of a development proposal. An effective GIS would be able to assemble the data needed to measure and portray the relevant information and also to quickly generate the various scenarios.

The fourth planning function, detailed development planning, requires a wide variety of spatial and tabular information pertaining to land use and existing resources. As Berry, J.K. (1991) said "the ideal GIS would generate a scenario that aids in finding common ground among competing factions".[32] This may be seen in the case of conflicting demand for a certain landscape resource such as a river. An effective GIS should be able to "aid" in generating a situation where the resource may serve as a main water-discharge channel while at the same time maintaining it as an effective amenity for the public, by highlighting the common areas between the two seemingly incompatible demands. Analysis may also include cost in term of acquisition of land or impact on these buildings if certain new development is carried out. A simulation on the impact of adding new elements into an existing neighbourhood may also be carried out, given adequate data.

Lastly, to be effective, planning needs feedback and review. As planning activity is to be seen as a process (McLoughlin, 1969; Chadwick, 1971), plans cannot be made once and for all. The process itself takes quite a considerable time. In many cases, by the time the plan is ready, the information and data upon which the plan is based, are already out-of-date or at least almost reaching that stage. The same is true in the case of the Kuala Lumpur Structure Plan.[33] It is therefore important that a means of monitoring the validity of information is built into the planning systems. The concept of feedback of information to evaluate plans and plan-making procedure makes it more important that information itself is continually updated and its quality improved (Geddes, 1939). Calkins (1972) suggested that "better planning will be achieved through better information, and better information will necessarily flow from an information system".[34] Data stored within a GIS can be updated and accessed easily by authorized users provided of course that updated data is available. It is therefore possible that data be updated on an almost daily basis. Continuous review of the emerging patterns and trends may then be done rather than five yearly as currently required by the law. In addition then to avoiding the need for costly periodic review exercises, such a tool should in theory match the dynamic nature of planning.

It may be seen in all the five functions above that planning is inherently a spatially oriented profession which involves a great deal of <u>ad hoc</u> decision-making based on the evaluation of alternatives. This in theory should make planning a good setting for a GIS to demonstrate its ability to manage a diverse set of spatial information and to form an information infrastructure. However as Goodchild (1987) observed, "in reality, most contemporary GIS place far more emphasis on efficient data input and retrieval than on sophisticated analysis".[35]

Many of the problems of planning arise from uncertainty. In 1972, the Department of Environment (U.K.) recognized the importance of an information system by saying that **"an information system is part of the mechanism for reducing uncertainty in the knowledge and understanding of the (physical, social and economic) environment....".**[36]

To be useful, an information system must have at least three critical characteristics: it must be descriptive, cognitive and normative. The first of these self evidently will help to describe the situation that the planning exercise is dealing with. The second provides the key factors and variables that can be analysed using planning models and other statistical techniques. The normative function contributes to the improved action by reducing the cost of actions with known consequences or by reducing uncertainty about the consequences of actions already taken or about to be taken. This is very important when one is dealing with environment. The ability to simulate a situation or to assess the direct and indirect impact upon an environment or resources if a certain course of action is taken, is necessary in helping the policy and decision-makers in discharging their duty properly.

The ability of an information system to inter-relate data sets is also very useful to planning. Since the relative positions of different map features are known to the system, sophisticated analysis of relationships between features across geographical space can in theory also be performed given adequate data. The primary focus in the manipulation stage is the idea of overlay. In fact "perhaps the most elaborate functionality of such systems rests on their ability to "overlay" different "levels" of data, such as those relevant to assessing the suitability of land for different types of development or conservation.

Various examples of applications of Geographic Information Systems (GIS) show promise for use in integrating urban landscape resources into urban planning systems. Dangermond (1983) gave an example of the use of the system for combining components of a large regional database of the physical and cultural attributes to select the most suitable site for a new town in Southern California. Berry, J.K. (1991) used it in the resource planning of the US Virgin Island, while Robinette, A (1991) applied the system in land management in the state of Minnesota.[37] Burrough, P. (1991) developed an application in a soil information system.[38] In these examples information was derived from various sources and formats, for example, printed maps, field surveys, aerial photographs and satellite images and was then brought together in a common scheme of geographical referencing (Grimshaw, 1988; Coulson and Bromley, 1990).

A Geographic Information System (GIS) should be able to support all the stages of spatial data processing including manual or semi-automated digitizing, the checking and editing of digitized data, edge-matching of digital map files and the output of information to a graphic device or hard copy plotter.

Structuring of data has been seen as one starting point in the formal organization of planning practice since the 1960s. Information systems have made development control more efficient and less laborious. However, urban planners are at present using GIS mostly to provide general focus and discipline for the planning process rather than in land suitability and environmental analysis, based on natural resource inventories (Yeh and Betty, 1990).[39] Chapter 4 will discuss in detail the concepts, functions and operation of a Geographic Information System (GIS).

CONCLUSION

For a study to be useful it must work within the strategic planning system that is already in place. However, the very nature of a strategic plan is fluid. It must have the ability to be flexible and be sufficiently organic to make it "strategic" in the full sense of the word. To be that the plan will have to have a sound database which will allow across-the-board analysis of potentials, constraints and underlying patterns. As it encompasses a relatively long span of time, it must be able to update itself because of the changing situation.

Geographic Information System (GIS) with its inherent ability to store, organize, retrieve and analyse data should provide a planning system with the above possibilities. However, the system must not be used just to provide automation, discipline or rationalization to the existing planning system; it must be used to bring into it the ability to take account and utilize the range of information on extrinsic and intrinsic resources that are available. It is important that the technology be used creatively to produce more sensitive environmental design solutions (Chapter 6).

NOTES:

1. Cooper, J., (1984), The Making of Malaysia: A Short History, **International Architect**, Issue 6/84, London, p.15

2.Bruton, M.J. (1984), **The Spirit and Purpose of Planning**, London, p.30.

3.Yaakub, A.B., (1992), **The Application of Geographic Information System for Urban Planning and Management: A Case Study of Squatter Settlement Planning in Kuala Lumpur**, Malaysia, Ph. D. Thesis, (Unpublished), University of Edinburgh, p.56

4.Diamond, D. (1979) quoted by Bruton, M.J., op. cit. p.12

5.Ibid, p. 12

6.Ibid, p.14.

7.Chadwick, G. (1971), **A System View of Planning: Towards a Theory of the Urban and Regional Planning Process**, Pergamon Press, Oxford, p.63

8.Ibid, p. 63

9. McLoughlin, J.B. (1973), **Control and Urban Planning**, Pergamon Press, London.

10.Koneik, A. (1991) in an interview in May, 1991 at the Penang Island Municipality, KOMTAR. Koneik was a member of the German Advisory Team working under the German Agency for Technical Cooperation (GTZ) helping with the development of conservation policy for Penang Island.

11.Christensen, K.S., (1985), quoted by Bruton, M.J. and D. Nicolson, **Local Planning in Practice**, Hutchinson, London, p. 57. She observed: "Actual problems vary in uncertainty over means and ends. If people agree on what they want and how to achieve it, then certainty prevails and planning is a rational application of knowledge. If they agree on what they want to do but do not know how to achieve it, then planning becomes a learning process; if they do not agree on what they want but do know how to achieve alternatives, then planning becomes a bargaining process; if they agree on neither means nor ends, then planning becomes part of the search for order in chaos"

12.Chadwick, G. (1971), op. cit. p.81

13.Bruton, M.J. and D. Nicolson, (1987), op. cit. p. 60

14.Newstrom et al., (1975), **Contingency Approach to Management Readings**, McGraw-Hills, New York, p.xiv

15.Christensen, K.S., (1985), op. cit. p. 66

16.Ibid, p.69

17.Federated Malay States Ordinance, 1935, Part IX

18.Central Area Development Plan L886 was renamed Comprehensive Development Plan No. 1039 (Central Commercial Area), Residential Density Zoning Plan L887 was renamed Comprehensive Development Plan No. 1040 (Density Zoning) and Land Use Zoning Plan L888 was renamed Comprehensive Development Plan No. 1041. These changes were made under the Emergency (Essential Powers) Ordinance No.46 of 1970.

19.The original area was 93 sq. kilometres and the enlarged area is 243 sq. kilometres.

20.The Japanese occupation and the struggle for independence following it changed the general attitude of the Malays toward living in urban areas and economic pursuit. The experience of living in urban areas because of the sheer deprivation during the occupation gave the Malays the chance to reevaluate their traditional misgivings about urban life-styles. The struggle for independence brought realization among the Malays that they would have to take a more active part in the urban economic and educational activities of the country (Tun Razak, Second Prime Minister of Malaysia, 1970).

21.The 13th May, 1969 racial riot is one of the blackest day in the history of Malaysia. It was fuelled by the feeling of insecurity among the native Malays who, a few days earlier, in a general election, had almost lost the control of the country to the more educated and economically effluent alien communities, namely the Chinese and Indians. On their parts, the alien communities were demanding a higher stake in the running of the country.

22.Roff, W.R. (1967), **The Origin of Malay Nationalism**, University of Malaya Press, Kuala Lumpur.

23.In trying to solve the problems brought about by disparities of income, in 1970 the government introduced a long term strategy of trying to eradicate poverty and economic inequality. Another important objective was the elimination of racial distinction through occupations. This was done by adopting a policy of actively helping the poor. It was contended that the resultant general upliftment of the economy because of massive investment in rural infrastructure, education, housing, and small businesses would provide a better investment climate for everybody, especially those that have already acquired expertise and acument in their related fields. This policy was known as the New Economic Policy (NEP).

24.Yaakub, A.B. (1992), op. cit. p. 45. Normally the squatters that occupy a particular site would be mainly from one of the three main racial groups. They are very well-organised politically. In a country where political affliation is mostly along racial lines, the squatters can actually have very a big political clout by threatening to join opposition of the same racial grouping en-masse if they are evicted.

25.In 1991 a few resident groups successfully challenged in court the decision by the Mayor to approve the development of condominiums in areas earmarked as low density housings by the Structure Plan.

26.This is in contrast with the United Kingdom experience where local authrorities and their planning departments comes under the jurisdiction of the Department of Environment, thus creating a linear procedure of environmental control.

27.Chin, P.K.F. (1993), Deputy Science, Technology and Environment Minister, quoted by the **New Straits Times**, NST Publications, 10, June, 1993.

28.Nor, M. Salleh (1990), **Forest Conservation in Malaysia**, Conference of Pan-Pacific Southeast Asia Women's Association, Kuala Lumpur, September, 17th.

29.Quoted by Cowen, D.J. and W.L. Shirley (1991), Integrated Planning Information Systems, in Maguire, D.J., M.F. Goodchild and D.W. Rhind (eds.) (1991), **Geographical Information Systems**, Longman Scientific and Technical, Avon, p.297

30.Ibid, p.297

31.Meyerson, M. (1956), Building the Middle Range Bridge for Comprehensive Planning, in **Journal of the American Institute of Planners**, No.22. See also Cowen, D.J. and W.L. Shirley (1991), op. cit. p.298

32.Berry, J.K. (1991), GIS in Island Resource Planning: A Case Study in Map Analysis, in Maguire, D.J., M.F. Goodchild and D.W. Rhind, **Geographical Information Systems: Principles and Applications**, Longman Science And Technical, London, Vol. 2, p.285 - 295.

33.The process started in 1980 and was only finished in 1984.

34.Calkins, H. W. (1972), **An Information System and Monitoring Framework for Plan Implementation and the Continuing Planning Process**, Ph. D. Thesis, Unpublished, University of Washington, p. 78

35.Goodchild, M.F. (1987), A Spatial Analystical Perspective on Geographical Infromation Systems in **International Journal of Geographical Information Systems**, Vol.1, No.4, p.334

36.Quoted by Yaakub, A.B. (1992), op. cit.

37.Op. cit., pp. 285-295. See also Robinette, A. (1991), Land Management Application of GIS in the State of Minnesota, in Maguire, D.J., M.F. Goodchild and D.W. Rhind (1991), **Geographical Information Systems: Principles and Application**, Vol.1, Longman Scientific & Technical, London, pp. 275-283

38.Burrough, P. (1991), Soil Information System, in Maguire, D.J., M.F. Goodchild and D.W. Rhind (1991), **Geographical Information Systems: Principles and Applications**, Vol.2, Longman Scientific & Technical, London, pp. 153-169.

39.Yeh, A.G.O. and M. Betty (1990), Applications of Geographic Information Systems in Urban and Regional Planning, in **Planning and Design**, Vol.17, No. 4, p.373

CHAPTER 4

GEOGRAPHICAL INFORMATION SYSTEM (GIS): DEFINITIONS, CONCEPTS, OPERATIONS AND SELECTION OF A SYSTEM

INTRODUCTION

The term Geographic Information Systems (GIS) was first used by the Canada Geographic Information System (CGIS) in the 1960s and which developed a national land capability classification to compile an inventory of all potentially productive land in Canada (Aronoff, 1989).[1] The task involved the whole spectrum of related disciplines; "integrating systems which bring together ideas developed in many areas including the fields of agriculture, botany, computing, economics, mathematics, photogrammetry, surveying, zoology and of course, geography, to name but a few" (Maguire, 1991).[2] One of its characteristics, therefore, is a great diversity of applications and competing claims of origins (Coppock and Rhind, 1991).[3] For this study, the details of this debate and the controversy it has generated is not relevant. This chapter, however, aims to discuss the definitions, concepts and operations of this relatively new technology as a preface to its use in the following parts of the thesis.[4]

The main purpose of a Geographic Information System (GIS) is to process spatial information, that is to "improve a user's ability to make decisions in areas of research, planning and management".[5] It involves a chain of steps from observation and collection of data to analysis and the production of information useful in some decision-making. It is as Smiths et al. (1987) said " a database system in which most of the data is spatially indexed, and upon which a set of procedures operated in order to answer queries about spatial entities in the database".[6] It follows that the system does not produce planning or management solutions by itself, like some expert systems that are commonly associated with computer-based technology, rather it **assists and supports** decision-making by facilitating and making clearer the options and their advantages and consequences or at least it should do so given an adequate data base.

In planning jargon, the above process is called impact analysis. It is only through a thorough study of its possible impacts that the optimum judgement may be made on a development proposal. This also means that the final solution to any problem is still under the control of the user. At local level, this opens up possibilities for improved performance in the daily task of planning which is basically planning control. At higher level, namely the strategic level, it aids the selection of alternatives through simulation procedures.

DEFINITIONS OF TERMS AND CONCEPTS

It may be appropriate to start with a broad definition of an information system. Lucas (1978) described an **information system** as: **"....... a set of organised procedures which, when executed, provides information to support decision-making".**[7] In simple terms, an information system may be conceived as a framework by which to ask questions and obtain answers from a data resource (Dueker, 1987).[8]

Geographic Information Systems (GIS)

It can therefore be inferred that geographic information systems are those information systems which share objectives and characters that are peculiarly geographic in nature and can be considered as one of a generic breed of information systems. Dueker (1979) observed that a Geographic Information System (GIS) is "a special case of information systems where the database consists of observations on spatially distributed features, activities, or events, which are definable in space as points, lines, or areas. A GIS manipulates data about these points, lines and areas to retrieve data for ad hoc queries and analyses".[9]

Despite the general inference above, it is actually quite difficult to give the exact definition of the term Geographic Information System (GIS). The difficulty stems from genuine academic debate about the central focus of current Geographic Information Systems (GIS) activity: whether it is hardware and software, information processing or applications.[10] However, taken in its broadest sense, a geographic information system or popularly known by its acronym of GIS is "any manual or computer based set of procedures used to store and manipulate geographically referenced data or geographic data" (Aronoff, 1989).[11]

One may see the origin of these systems in the largely manual work of McHarg (1969).[12] However, as one may recall one of the major criticisms put against the overlay mapping methods devised by McHarg is its inability to handle the large volume of data which characterizes modern day planning exercises.

Focussing on the hardware and software aspects of GIS, the Environmental Scientific Research Institute (ESRI) of Redlands, California defines a Geographic Information System (GIS) as "a tool for storing and manipulating geographic information (or data) in a computer. Once in the computer, you can ask questions of the database and manipulate, analyse, and display geographic information with speed and a set functions not otherwise possible".[13] These claims are perhaps not entirely unexpected from an organization whose interest is in the marketing of their hardware and software.[14]

However, focusing on the information system aspect, Goodchild (1985) defines a GIS as "..... a system which uses a spatial database to provide answers to queries of a geographical nature". He expands this definition by saying ".....since putting spatial data into a computer at great expense for the sole purpose of getting it out again would be pointless, a GIS must allow a variety of manipulation to be carried out such as sorting, selective retrieval, calculating and spatial modelling. We also expect a full range of functions to allow input of data in map form and cartographic output".[15]

Tomlinson (1987) emphasized the digital nature and analysis capacity of GIS when he defined it as ".....a digital system for the analysis and manipulation of a full range of geographic data, with associated systems for inputing such data and displaying the output of any analysis and manipulation".[16] The National Science Foundation (NSF) clarified the point made by Tomlinson by defining GIS as " a computerised database management system for capture, storage, retrieval, analyzing and display of spatial data or information defined by its location" (Taylor, 1989).[17]

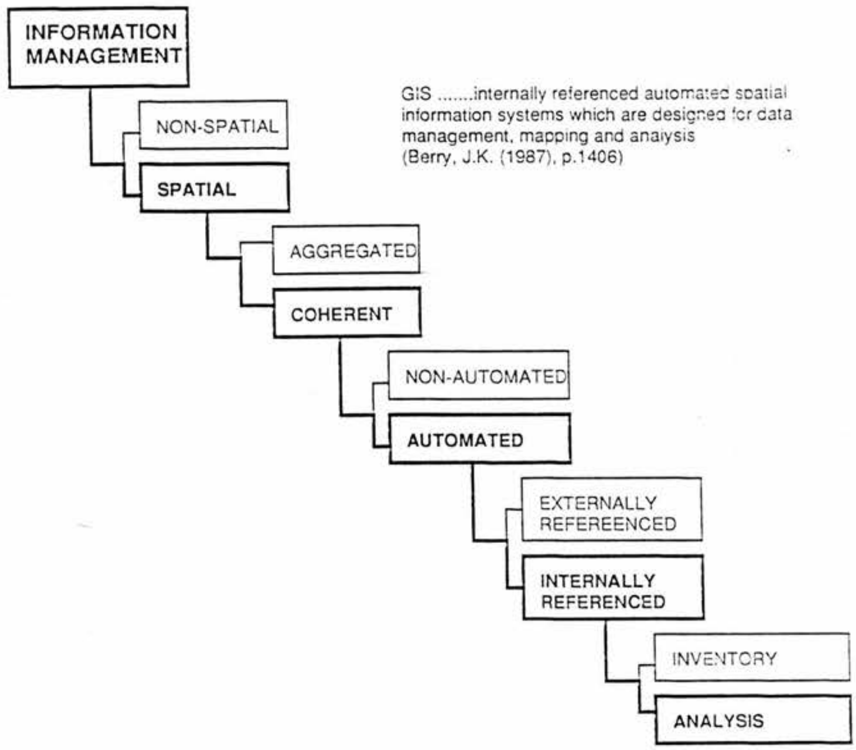


Fig.4.1: Classification Scheme For Geographic Information Systems (GIS), Berry, J.K. (1987), pp.1406

Most current Geographic Information Systems (GIS) follow the definition by Berry (1987). He defined a GIS as: ".....internally referenced, automated, spatial information systems, that are designed for data management, mapping and analysis".[18] It follows that five major distinctions are inherent within a Geographic Information System (GIS) as shown in Fig.4.1 on the previous page:

Firstly, there is a distinction between spatial and non-spatial information. While much administrative information, such as that relating to payroll and personnel, tend to be non-spatial, others are geographic such as natural resources, land use, and lot boundaries.

Secondly, spatial information may be sub-divided into that which is spatially aggregated or descriptive, for example, soil descriptives and timber production yield tables, and that which is geographically referenced and can be located on the ground and mapped, such as elevation, soil types and land cover.

Thirdly, mapped data can be managed by automated or non-automated means. While maps for land sale contract and timber inventories may be produced by manual means, a map that requires a bigger volume of information such as contours, vegetation, soil, ecology and building materials may be, in the long term, better produced by automated technology.

Fourthly, the spatially referenced database may be external or internal to the automated systems; the most common spatial databases are those that are externally referenced for locational control. This means that the link between the database and maps which are used to tie the data to a location on the ground are external to the computer. By contrast, internally referenced systems have automated linkage between the data (thematic attributes) and location of the data on the ground (spatial attributes). The locational information may be organised as a collection of line segments; identifying the boundaries of points, linear and areal features; or an alternative organization, establishing an imagery and pattern over an area, which then stores the values identifying the characteristic at each grid unit.

Finally, the internally referenced methodology of a Geographic Information System (GIS) allows the user to examine and manipulate spatial relationships within the data. The processing functions of a Geographic Information System (GIS) may be grouped into four categories: computer mapping, spatial database management, spatial statistics, and cartographic mapping. Of these four processing functions, the computer mapping and spatial database capabilities form the backbone of most Geographic Information Systems (GIS) applications. On the other hand, spatial statistics and cartographic modelling are gaining prominence among the more advanced Geographic Information Systems (GIS).

To summarise then, it would be fair to say that a Geographic Information System (GIS) may offer a method of capturing, storing, retrieving and analysing data which is held in a structured form, has locational identifiers and can therefore be manipulated and mapped in a variety of ways.

SUB-SYSTEMS WITHIN A GEOGRAPHIC INFORMATION SYSTEM (GIS)

Traditionally, and as previously mentioned, spatial analysis uses an approach called "cartographic modelling". The origin of this approach can again be traced back to the work of McHarg (1969). This approach, popularly known as **overlay mapping**, involves models or representations which are expressed in cartographic forms (Tomlin, 1990, Tomlin, 1991).[19] As the term suggests, cartographic modelling is oriented more towards process than product. Its major concern is not the way in which data is gathered, maintained or conveyed, but the way it is used. Though persuasive and effective, especially where there is a mix of different kinds of geometric phenomena, for examples, points (wells), lines (rivers, roads), and areas (lots, buildings, regions), this simplified joint description fails to incorporate the ancient foe of spatial analysis: unique distribution, spatial autocorrelation, and the lack of general spatial statistics for multivariate relationships (Aangeenbrug, 1991).[20]

Geographic Information System (GIS) attempts to address the above problems by breaking them into components, and assembling itself through a number of inter-related sub-systems. Each of the sub-systems exists to perform a specific task, though not only related to the above problems. On the whole, the system may then be described as having four basic organizing sub-systems, namely data input, data storage and retrieval, data manipulation and analysis, and reporting and display of information in tabular and map form (Marble and Puequet, 1983).[21] As they have forcasted, spatial modelling is becoming an increasingly important element of the system.

The data input component builds a geographic database (Burrough, 1986).[22] It converts raw digital and analogue data to a form useable by the computer. Sources of this data include maps, field observations, aerial photographs and other remote sensing records. The function may include digitizing, scanning, error detection, verification, editing and format conversions to allow transfer between data structures and data media, before being used by subsequent components of the Geographic Information System (GIS).

A range of tools are available to perform the above task including the digitizer, scanner, interactive terminal, and devices necessary for recording data already written on magnetic media. The input function still consumes a major proportion of a Geographic Information System (GIS) operating cost in production systems and also still remain a major hurdle to the adoption of the technology.

Data storage and retrieval is a process that involves the handling of large sets of digital geographic data as well as non-spatial data. It should allow storage of data efficiently and allows retrieval and update in a non-redundant manner. It should be able to support multi-users and multi-data bases while containing facilities to prevent unauthorised use of data or its accidental corruption. Such a system is normally referred to as database management system (DBMS).

Data manipulation and analysis normally perform a variety of tasks in support of user requirement for a specific information in the course of a management decision. The typical data manipulation is summarised by Rind and Green (1988) in Table 4.1. These include conversion, geometric conversion, generalization and structure classification, enhancement, and abstraction.

Procedure for data analysis may include spatial measurement, statistical analysis, and report generation. Information created from manipulation and analysis may be added to a database for subsequent retrieval or communicated to the user as hard or soft copy.

The display component of the system includes software for the display of maps, statistical output such as graphs and tables and in some Geographic Information Systems (GIS), the image on demand. In others the display are the more traditional hard copy permanent image devices. This study uses the former.

A Geographic Information System (GIS) may also call upon "external" packages to assist any of its sub-systems and operations (Fig. 4.2). It should also be possible for the data to be transferred rapidly between databases held on different computers, and for one Geographic Information System (GIS) to communicate with and benefit from the capabilities of others. There is thus in theory a multiple flow of information in Geographic Information System (GIS) (Yaakub, 1992).[23]

DATA INPUT AND ENCODING

Data capture (e.g., manual or automatic digitizing)
Data validation and editing (e.g. quality checking, detection of digitizing errors such as over-shoots),
Data storage and structuring (e.g. construction of link/node topology, chain coding).

DATA MANIPULATION

Structure conversion (e.g., conversion vector-to-raster, quadtrees to vector),
Geometric conversion (e.g., map registration, 'rubber-sheet' transformation, scale change, map projection change or image warping),
Generalisation and classification (e.g., coordinate thinking, reclassification, aggregation of attribute data),
Enhancement (e.g. image edge enhancement and texturing, line fractalization),
Abstraction (e.g., calculations of areas centroids, proximal features, Thiessen polygons)

DATA RETRIEVAL

Selective retrieval of information based on spatial or thematic criteria, including 'browse' facilities.

DATA ANALYSIS

Spatial analysis (e.g., polygon overlay, route allocation, intervisibility, slope and aspect calculation),
Statistical analysis (e.g., historgrams, frequency analysis, measures of dispersion, multivariate analysis),
Measurement (e.g., line length, area and volume calculation, distance and direction measurement).

DATA DISPLAY

Graphical display and hard -copy devices,
Report writing (e.g., automatic text reporting on database contents in a standard format, production of summary tables)

DATA MANAGEMENT

Integrated database management facilities including support and monitoring of multi-user access to the database, provision 'roll-back' facilities for use in the event of system failure, organisation of the database for efficient storage and retrieval without data redundancy, automatic maintenance of database security and providing the user with a 'data independent' view of the database.

Table 4.1: A Classification of GIS Functions (based on Rind, D.W. and N.P.A. Green (1988), p.175

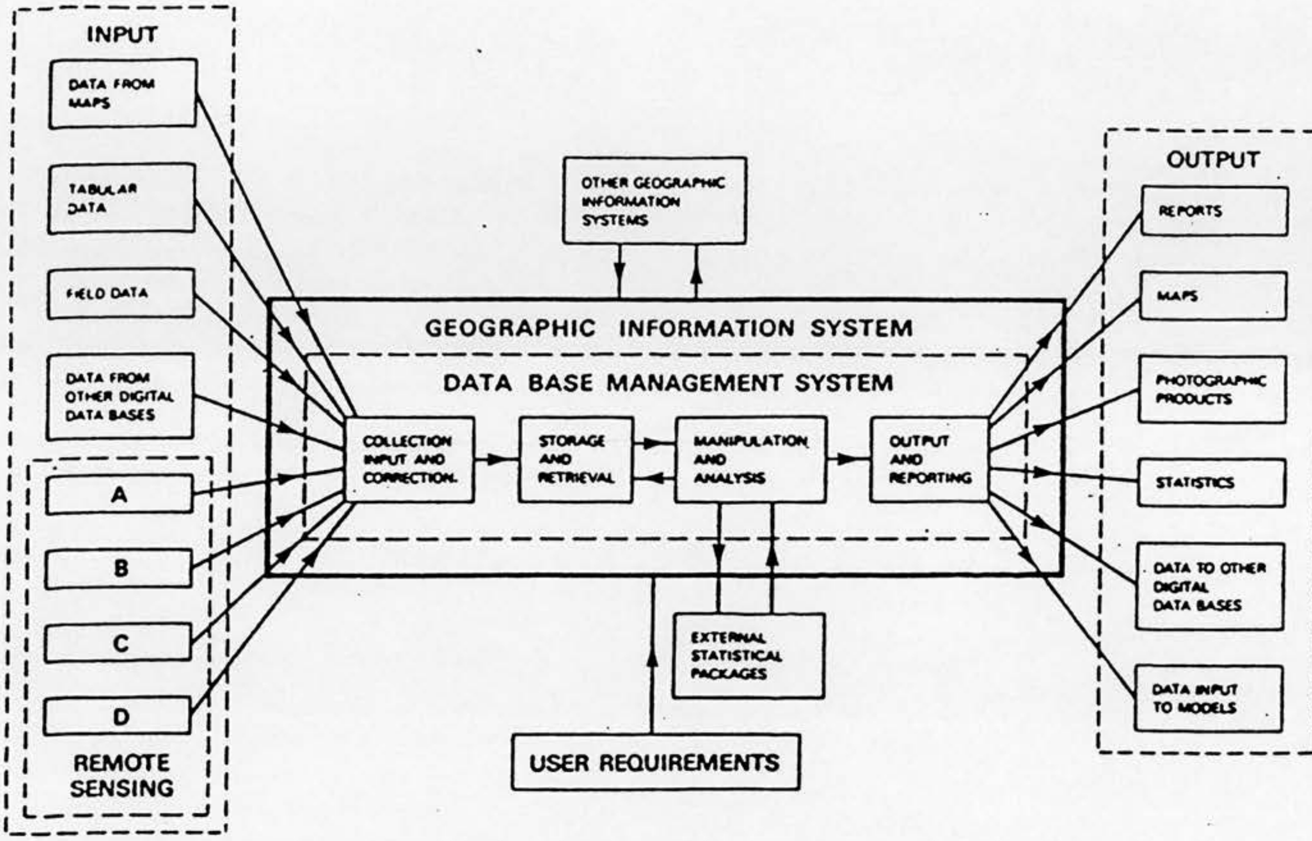


Fig.4.2: Principal Components and Functions of An Idealized Geographic Information Systems (GIS) for Urban and Regional Planning (Young, J.A.T., 1986, p.5) [24]

DATABASE AND DATA MODELLING

In essence, the "geographic" qualifier which distinguishes the system from other systems refer to the "spatial" characteristics of the data being used. Environmental planning, whether in urban or in rural areas, is characterised by the use of data which, in many instances is related to spatial or geographic locations. This type of data is referred to as "geographic data" (Burrough, 1986, Aronoff, 1989).[25]

Geographic data is commonly characterized as having two fundamental components or descriptors; firstly physical or class, and secondly locational. Physical descriptors might be the area under vegetation cover, or of built-up area or the length of a river. Their class might be the type of vegetation cover, its plant associations, its density, or the types of buildings that are on a site, age-groupings of the buildings, their cultural and historical importance; or the width of the river, and whether it is a tributary or the main system itself.

Locational descriptors are usually specified with reference to a common coordinate system such as latitude and longitude. In some countries, these coordinates are based on the Universal Transverse Mercator (UTM), in others they are more regionally based as in Malaysia where the system is based on the State Plane Coordinate system. Spatial location is referred to as geographic position.

The next fundamental component in a Geographic Information System (GIS) is time. The time component is often not stated explicitly, but is often critical. Geographic information essentially describes a particular phenomenon at a location at a particular time. A land cover map describes the location of different classes of land cover as they existed at the time of data collection. If the area is changing rapidly, such information is by definition always out of date and might be better classified as historical. The information may be unsuitable for decision-making that requires the current status of the land. However, the data may be invaluable for analyzing historical trends of land development within the area. An example may be in reclamation work involving revegetation of an area. Information pertaining to the history of plant presence in an area may help the decision-maker to work out the necessary strategy. A similar case might be about the conservation of an urban built-up area such as referred to in this thesis. Information on the types of buildings and types of facade along each street, building materials, street furnitures and materials are critical in developing conservation policies. Working out the changes made over time may also serve as an early warning system of an area under pressure. This may be done by comparing the past record with the present setting.

Data relationship is also a critical factor in a Geographic Information System (GIS). Large numbers of relationships exist between different types of spatial objects. Relationships may be one-to-one as in the case of a land parcel and its use, but may be one-to-many as in the case of topography to vegetation type, soil, aspects and micro-climate. For a computer-based Geographic Information System (GIS), relationships must be expressed in a computer compatible way (Yaakub, 1992).[26]

Geographic data is normally in large quantity and in great diversity (Peuquet, 1984; Chorley, 1988).[27] It is therefore important that a Geographic Information System (GIS) is also characterised by its ability to store such data in an efficient and permanent manner (Frank, 1984).[28] The combination of all these necessary characteristics within a database makes geographic data particularly difficult to handle. It is too complex to record all the information for a geographic entity. It would even be more difficult to retrieve the information efficiently. The database system of a Geographical Information System (GIS) provides the means of organizing the spatial data and non-spatial attribute data for efficient storage and retrieval and potentially also for analysis.

A database is a collection of information about things and their relationships to each other. For example, a database may consist of items which may be processes or concepts. Within a database environment, the processes of erosion, water pollution, and agricultural development may be related to the item "rainforest clearcutting". The objective in collecting and maintaining information in a database is to relate facts and situations that were previously separated.

A **data model** is the conceptual organization of a database. It can be thought of as the style of describing and manipulating the data in a database. It is a general description of specific sets of entities and the relationships between them. It is concerned with sub-dividing a portion of reality until the entities, relationships and attributes are identifiable and understood within the context of a database. By using abstraction, an intermediate view between the reality which relates to the phenomenon as it actually exists in the world, and the database which represents how the data is viewed by the computer can be represented.

Puequet (1987) observed that a geographical data model has four elements:

i) the various types of spatial entity, that is, points, lines and polygons;

ii) the descriptive attributes for each of the entity types;

iii) the geometric descriptions of each entity type either using a "raster" or "vector" approach (see Appendix 7);

iv) the relationships between entities, which include topographical relationships such as "consist of", "part of" and "bounded by", and relationships describing the class of objects comprising a given spatial entity.

No model can properly represent all aspects of reality (Yaakub, 1992) but by including all identifiable entities and relationships, one should be able to produce a more robust and flexible model that can handle a number of applications. On the other hand, one may choose to be selective and choose only those entities and relationships which are essential to the intended use, thus making the model simpler but more efficient in terms of storage space and ease of use. However, the later model may be less versatile in terms of application and future developments.

In practice there has to be a trade-off between the two extremes (Puequet, 1984).

There are basically three types of data models: hierarchial, network and relational (Burrough, 1986, Aronoff, 1989, Zin, 1989 and Yaakub, 1992). As the name suggests, in hierarchial models, data is arranged according to hierarchy which necessitates a hierarchial structure of data interogation. There is no particular hierarchy of data in network data models, however, intermediate records have to be created during multiple relationship data queries.

This study utilizes the last type. In a **relational data model** there is no hierachy of data within a record; every data field can be used as a key. The data is stored as a collection of values in the form of simple records, termed **tuples**. Each tuple represents a fact, that is, a set of permanently related values. The tuples are grouped together in two-dimensional tables, with each table usually stored as a separate file. The table as a whole represents the relationships among all the attributes it contains, and so it is often termed a **relation**.

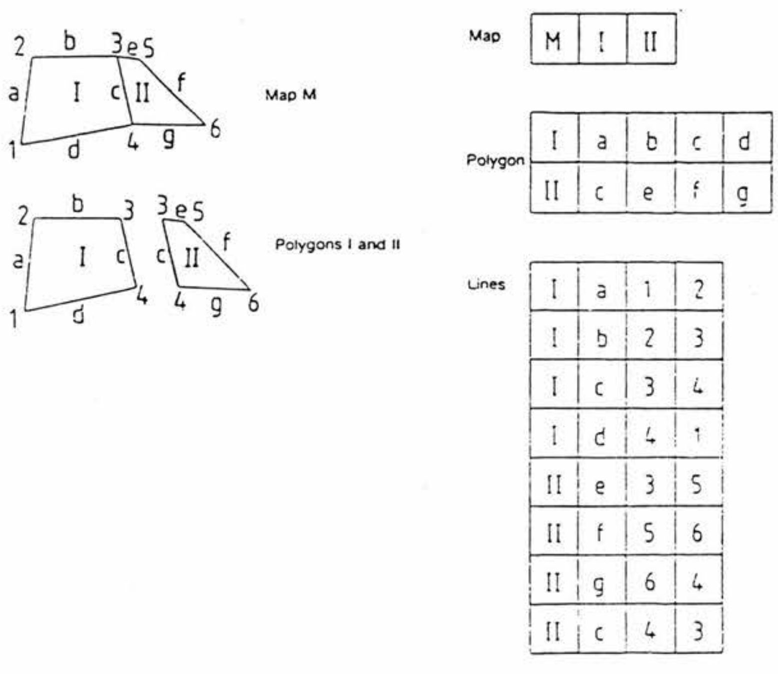


Fig. 4.3: A Sample of Map 'M' in Relational Data Form (Burrough, P., 1986, p.17-18)

Search in a relational data model can be made of any single table using any attribute fields, singly or together. Searches of related attributes that are stored in different tables can be done by linking two or more tables using any attribute they share in common. This procedure is called a join operation. Interestingly, the shared attribute need not be the relation being analyzed. This "logical join" operation may give a relational model great flexibility. It may be able to accommodate diverse queries for which it was not specifically designed. Fig. 4.3 on page 156 shows how the data of a sample map 'M' is stored within a relational data model.

Bowers (1988) and Date (1983) summarised the advantages of relational data models as below:

i. The relation is more flexible than the other models. The way the data value exists in relational tables does not in any way restrict the kinds of processing that can be done. In the hierarchial and network models, manipulation of data is restricted by the structure built into the data model.

ii. The relational data model has a sound theoretical base in mathematical theory. The opportunity exists to use the mathematics of relations as the basis for data processing procedures instead of programming. However, most implemented systems provide a programming language interface, not a mathematical one.

iii. The organization of the relational model is simple to understand and, therefore, is a good vehicle to communicate database ideas.

iv. The same database can generally be represented with less redundancy using the relational model than the other two models.

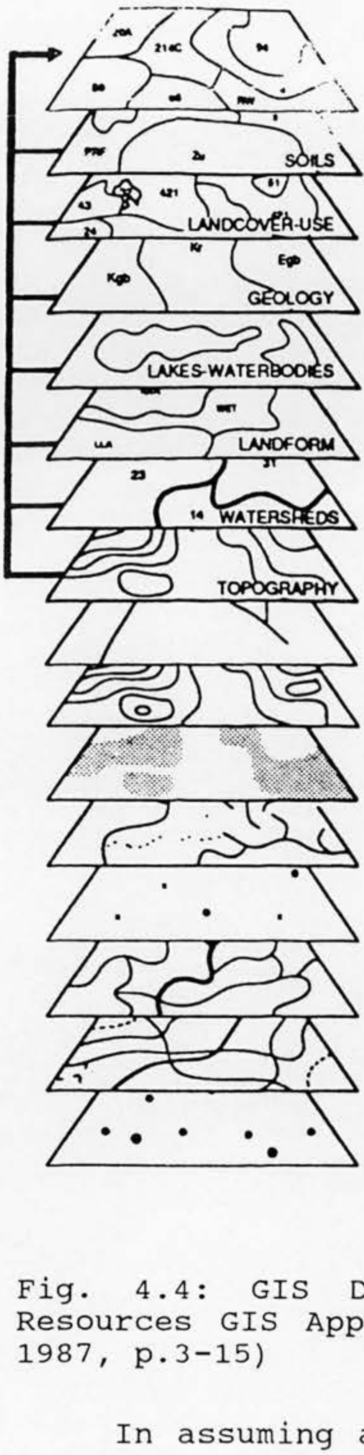
Its major disadvantages are that it is more difficult to implement and because of the absence of physical links it requires that the manipulation of data be based on matching values in relational tables. As this is much more time-consuming, the system tends to be significantly slower than the previous two.

GEOGRAPHIC INFORMATION SYSTEM (GIS) ANALYSIS FUNCTIONS

What distinguishes a Geographic Information System (GIS) from other types of information systems are its spatial analysis functions (Goodchild, 1988). These functions use the spatial and non-spatial attribute data in its database to answer questions about the real world. The Geographic Information Systems (GIS) database is a model of the real world that can be used to mimic certain or selected aspects of reality. It may be represented in words, in mathematical equations, or a set of spatial relations displayed as a map or stored in the computer hardware and software of a Geographic Information System (GIS). In many cases, the model is used repeatedly to perform analyses that test alternative scenarios or to answer questions about what exists now or existed at some point in the past. Perhaps more importantly, it can be used to predict what will happen at a certain point of time in future. Its ability to predict the consequences of proposed activities is perhaps most important to land use and environmental planners.

There are a few concepts that have to be understood in the Geographic Information Systems (GIS) terms before one contemplates using a GIS as an analysis tool. The first of these is the concept of **data layer** (Fig. 4.4). A data layer consists of a set of logically related geographic features and their attributes. A data layer may consist of land parcels or vegetation or land use. It may also be road and railway as a combined transportation data layer and streams and lakes as a hydrology data layer.

Analysis in a Geographic Information System (GIS) environment revolves around asking the right questions to the database. Aronoff (1989) suggests that an "end to beginning approach" in framing an analysis (Fig. 4.5).



LAYER NAMES:	ATTRIBUTES:
TERRAIN UNITS (polygons) Input Scale: 1:50,000 to 1:100,000	•Soil Types Component Texture Depth Slope Drainage Erosion pH Nitrogen Phosphorus Potassium •Landcover/Use Dominant Species Canopy Closure Stem Density Mid-Story DBH •Geology •Lakes and Waterbodies •Landform •Watershed Basin •Topography Type
FAULT (lines) Input Scale: 1:50,000 to 1:100,000	• Type • Name • Hazard
ELEVATION (lines and points) Input Scale: 1:50,000 to 1:100,000	• Elevation
SLOPE-ASPECT (polygons) Input Scale: 1:50,000 to 1:100,000 Derived from ELEVATIONS	• Slope • Aspect • Surface-area
STREAMS (lines) Input Scale: 1:50,000 to 1:100,000	• Name • Type • Width • Periodicity • Order
WELLS-GAUGING STATIONS (points) Input Scale: 1:50,000 to 1:100,000	• Well Number • Gauging Station Number • Springs • Basin Number
OWNERSHIP/ADMINISTRATIVE (polygons) Input Scale: 1:50,000 to 1:100,000	• Owner(s) • Township/Range • Section • County • Local Districts • State Districts • National Districts • Mineral Leases
TRANSPORTATION LINES (lines) (Roads, railroads, etc.) Input Scale: 1:50,000 to 1:100,000	• Name • Type • Width
SETTLEMENT/POINTS OF INTEREST (points) Input Scale: 1:50,000 to 1:100,000	• Type • Description (house, historic, archaelogical)

Fig. 4.4: GIS Data Layers Commonly Used in Natural Resources GIS Applications. (ESRI, Redlands, California, 1987, p.3-15)

In assuming a useful answer has been given, one may think about the type of question that has been asked, what concerns has been addressed, and what data, including judgements, may have been used in the analysis that produce those answers. This will ensure that the effort has been

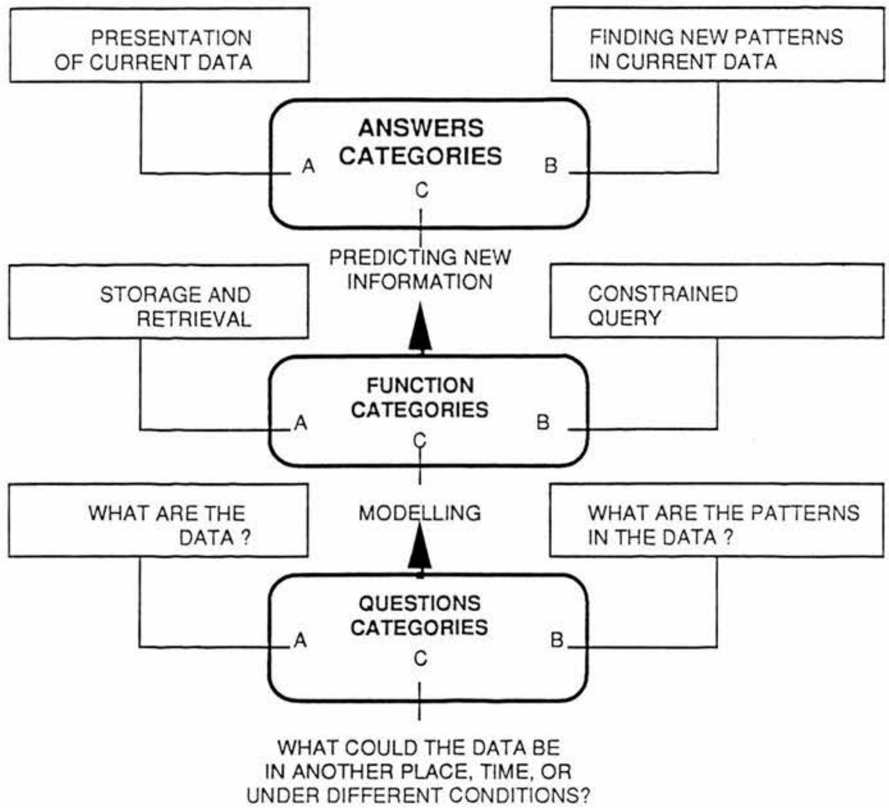


Fig. 4.5: Categorising Questions, Functions and Answers in a GIS Analysis (Aronoff, 1989, p.190)

focussed on answering the appropriate questions. In a spatial analysis, a Geographic Information System (GIS) uses three categories of functions: a) storage and retrieval functions; b) constrained query functions, and c) modelling functions (Appendix 7).

APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) IN URBAN LANDSCAPE RESOURCES PLANNING

There are three areas where the use of Geographic Information Systems (GIS) probably have direct impact on urban landscape resources planning. These are public policy analysis, urban GIS application, and land resource information system (LRIS).

In the first application the link between Geographic Information Systems (GIS) and public policy analysis is best viewed as a system analysis model (Fig. 4.6). The

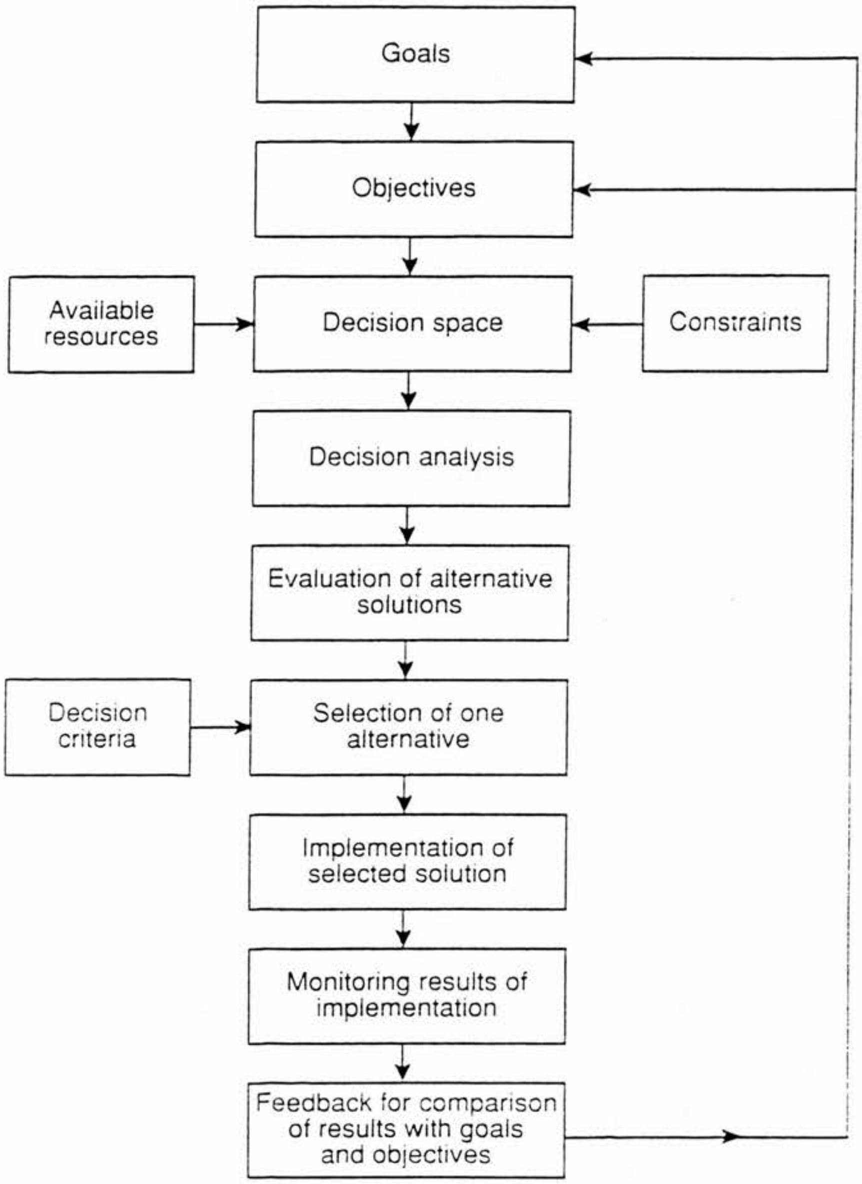


Fig. 4.6: The Public Decision-Making Systems Model (Calkins, H.W., 1991, p.235)

model assumes one or more issues, problems or conditions have been recognized and that remedial actions are necessary. The model starts with a definite set of goals and objectives, proceeds to a decision space bounded by resources and constraints, and this leads in turn to a set of alternatives for evaluation. Possible solutions are considered in sequence, the evaluation of each proceeding on the decision criteria which have previously been defined. This part corresponds with what we understand as a general system model (see Chadwick, G., 1971 in Chapter 3).

The next two components of the general system model are monitoring the results and evaluating the performance. These are for the purposes of adjusting the implementation mechanisms. Effective monitoring and evaluation mechanisms need to be well-defined. An information collection activity must be implemented to support the monitoring and evaluation activities. Because of their inherent qualities, GIS may make a useful contribution to these activities. However, because a long-term commitment is required in these activities, Geographic Information Systems (GIS) must be integrated into the entire policy system of policy analysis, that is, the planning system.

The ability to use a Geographic Information System (GIS) effectively to assist in the public policy area requires two conditions to be met (Calkins, 1991).[29] The first condition is the existence of a rational (or at least partially rational) process for the formulation of the public policies. The second condition is the ability to quantify significant attributes of the policy. These two conditions exist in Malaysian urban planning systems.

If the first condition exists, a Geographic Information System (GIS) can be used in a rational planning process to: firstly project and display the probable patterns of future development in order to permit decision makers to visualize the direction of the development in question; secondly, to generate and test alternative plans to provide information to decision makers; and lastly to monitor changes resulting from the plan implementation. The last use is succintly described by Schultze (1970) as ".... government programmes rarely have an automatic regulator that tell us when an activity has ceased to be productive or could be more efficient, or should be displaced by another activity. In private business, society relies upon profit and competition to furnish the needed incentives and discipline to provide feedback on the quality of decisions. The system is imperfect, but basically sound in the private sector - it is virtually non-existent in the government sector. In government, we must find another tool for making the choices which resource scarcity forces upon us".[30]

A necessary step if a Geographic Information System (GIS) is to be useful as a decision support tool for public policy, is quantification of attributes relevant to policy issues. This means the quantifications of goals, objectives and targets of policies or programmes. In the strategic planning system that exist in Malaysia, goals and objectives tend to lack specificity and only describe conditions that it hopes will evolve at some future date. This condition entails the construction of "operational criteria" to measure each relevant goal, objective and target.[31] A successful use of the system depends on the ability to define attributes related to proposals. This is especially important in the evaluation of the impact of a proposal. This is because evaluation of a public policy can only be carried out if a causal relationship between policies and change can be demonstrated (Calkin, 1991).

There are various urban applications of Geographic Information Systems (GIS). Among these are locational analyses for various urban activities such as housing, commerce and industries. Utility applications (Mahoney, 1991), land suitability and facility sitings (Siderelis, 1991; Berry, 1991; Cowen and Shirley, 1991) are typical applications. Just as in the public policy use, Geographic Information Systems (GIS) can be useful in three areas in urban application.

Firstly, the system can assist in the projection of future pattern of development of the above activities. In this use, the system can assist in the selection of most suitable areas according to a set of criteria, including environmental criteria such as optimization of urban landscape resources.

Secondly, the system can assist in the modelling and analysing of the alternative plans, also according to a set of criteria. The backing of an exhaustive database is a prerequisite of this function as modelling or analysis can only be carried out in an environment where information is readily available.

Lastly, a Geographic Information System (GIS) can assist the monitoring of urban development. As developments tend to be undertaken individually and appears to bear scant relationships with each other, it is important that a means be found to study their underlying whole.

Land Resource Information Systems (LRIS) are defined as an application of Geographic Information Systems (GIS). The contents of Land Resource Information Systems (LRIS) typically include a wide range of data, such as those describing the character and distribution of the resources themselves. Other data includes environmental parameters that reflect human activities and programmes affecting the land resources; both the natural and man-made such as physical infrastructures. Cadastral data, though not for the purpose of registry and taxation but rather for assessing the relationship of land ownership to use of resources is often one of the major components of the information system.

A large volume of data is normally characteristic of the system's application. Because data such as land cover, soils, and natural resources is normally stored as homogenous polygons, polygonal data has dominated the applications. Another reason for this is the commonly used and easy to understand polygon overlay operations. Burrough (1991), however, pointed to the weakness of this particular application because according to him internally homogeneous polygons are sometimes gross approximations, especially in data such as soils, wildlife, and vegetation where boundaries are never really accurate.[32]

The system has capabilities for data integration and spatial analysis. It is therefore possible to have links with diverse data and make use of polygon overlay, buffer generation and develop structured spatial models. This last application is especially important in the study of urban landscape resources in micro-environment such as in an intensely built-up urban areas.

CHOICE OF A GEOGRAPHIC INFORMATION SYSTEM (GIS) FOR THE CURRENT STUDY

In recent years several organizations in Malaysia have acquired some form of information systems to assist their tasks. Most of these are oriented toward normal local authority routine work of rates collection and budgeting and administrative planning and management (Masser, 1990). A few however have been concerned to assist normal development planning activities. The National Integrated Data System (NIDAS) developed by the Universiti Sains Malaysia (USM) in Penang demonstrates the technical and economic feasibility of constructing and integrating data systems, which could then be the prototype of a national integrated system for administrative planning and monitoring purposes (Yaakub, 1992). The Kelang Valley Planning Coordination Agency (KVPCA) which was set up to coordinate development within Kelang Valley (which includes Kuala Lumpur), consequently developed the Kelang Valley Regional Planning Information System (KEVIS) (Mat, 1987). In an ambitious program, the Survey Department of Malaysia is embarking on developing a Computer Assisted Mapping System under the Fifth (1986-90) and Sixth Malaysia Plan (1991-95).

The information systems developed above are basically database systems. Urban planning has a lot to do with the use of resources; both extrinsic and intrinsic. Beside the spatially referenced data like parcel boundaries, building sites, ownerships, data such as the quality, history, materials and use of the buildings are also extremely important for a site. The list is much longer when one takes into consideration the environmental factors. Among those included may be the vegetation, soil, ecology, slopes, aspects, and hydrological characters of the site. It would also be important to know the development status of the site. Combined with the public perception of the site and the relative importance of each particular resource, such information will provide a significantly better input for the urban planning process.

Geographical Information Systems (GIS) have facilities which deal with the data requirement for the above functions. The potential of this technology to store, manipulate and display spatial data is considerable. Its important capability is in handling both digital cartographic data as well as the associated databases of attribute information for map features (Healey, 1988).[33] The systems can store the map coordinates of point location, and of linear and areal features. At the same time, these features have attributes that must be stored in a database. Simultaneous manipulation of both the database and digital map can be carried out once all the data is stored. This is especially important in urban planning exercises, where a wide variety of data with their respective physical and environmental attributes need to be consulted before a decision is made.

In urban planning and management, increasing numbers of local authorities throughout the world are now using one form or another of the Geographical Information Systems (GIS). Technological progress in the last few years has removed many of the barriers which inhibited the development of geographic information systems. In fact Campbell and Masser (1992) reported that 85 (16.5%) local authorities in the United Kingdom have already acquired a Geographic Information System (GIS), 44 (8.6%) have a firm intention of acquiring one within a year and 227 (44.2%) are actively considering acquiring a system.[34] In Malaysia, the Department of Planning in the City Hall of Kuala Lumpur is now toying with the idea of acquiring a system, probably one which is Personal Computer-based. A group of its planners are now starting to utilise some simple digital softwares, for example raster-based IDRISI and and vector-based Mapinfo softwares which run together with DBASE4 programme which handle the attribute data. The City Hall of Kuala Lumpur is also currently employing the Ledger Accounting Finance Information System (LAFIS) to keep track of its relatively large rates collection. One of its planners had just completed a diploma course in Geographic Information Systems (GIS) at the International Institute for Aerospace Survey and Earth Sciences (IIAES) in Holland.[35] Another one has graduated with a diploma in computer programming from a local institute while another is currently pursuing a Master of Philosophy (GIS) at the Universiti Teknologi Malaysia. The Department of Urban Planning, Kuala Lumpur is also very keen to help urban studies using the technology as a means of testing the ground for an even bigger commitment in the future.[36] Even though these development are ad hoc, at times personal in nature, and still a long way from a point of real Geographic Information System (GIS), it is an encouraging development in keeping with the "small is beautiful philosophy" (Masser, 1990).

Some academic institutions in the country are already using the technology but in a small way. The University of Malaya (Geography Department) has recently used SPANS software in studying the green areas of Kuala Lumpur and the Universiti Teknologi Malaysia has acquired a P.C.-based ARC/INFO software for a study on natural resources in Johor. The former has also recently advertised to fill a position of an Associate Professor in Geographic Information Systems (GIS). The most advanced development so far was the recent setting of a Centre for Geographic Information Systems at the Universiti Teknologi Malaysia with a set objective of promoting the technology through various courses ranging from a graduate course to a two week introduction.[37] Meanwhile, the subjects pertaining to the technology have been included in the curriculum of the various courses offered in the various universities.[38]

Enthusiasm must be tempered with caution. Campbell and Masser (1992) have pointed out that introducing Geographic Information Systems (GIS) technology must involve overcoming entrenched institutional procedures and individual staff members with conflicting personal motivations.[39] Masser observed the presence of these problems during his study on the use of the technology in Malaysia in 1990.[40]

Owing to its wide availability on minicomputers and personal computers (PCs), ARC/INFO (ESRI Inc., Redland C.A.) software was chosen. It is one of the most widely used systems available today (Dangermond and Burn, 1986; Wiggins, et. al., 1987; Green, 1987; Rais and Suharto, 1990; Yeh, 1990). The ARC/INFO system consists of two components: ARC and INFO. ARC is a spatial data handling system and INFO is a standard relational database.

ARC/INFO is a Geographic Information System (GIS) built around a hybrid data model (Yaakub, 1992). It uses a vector topological approach to the handling of digital map data and a relational approach to the storage of attributes for map elements. Its topological structure has three very important advantages: Firstly polygon boundary data is efficiently stored as structured networks of line segments or areas, rather than as closed polygon loops. Secondly certain types of spatial analysis which are not practical without topological structure can be performed. Lastly the structure allows for the storage and processing of very large map coverages using a tiling structure and "Map Librarian" type facilities.

The relational type file handling Database Management System (DBMS) used by ARC/INFO allows the user to associate and inter-relate information from several files by matching selected codes which are common to each file. ARC/INFO contains attribute manipulation capabilities which can be combined in a number of ways to support further analysis. They include firstly the "record selection" function. In this function the RESELECT command in INFO can be used to select a subset of records for further manipulation. INFO supports a full set of arithmetic and logical operators which can be used in specifying selection criteria.

Secondly the "relate or join" function. In this function records from two or more INFO files can be related by using a common item between the files. Thirdly the "Calculate or Update" function. In this function new values for items in an INFO data file can be calculated using a standard set of arithmetic functions including addition, subtraction, multiplication, division, exponentiation, data calculation, natural log and width determination for character items.

In case of complex tabulation of the attribute data being required, either INFO programming can be used, or the data can be transferred into the ORACLE database (ORACLE Corporation, Belmont, CA.), which has sophisticated query-processing facilities through the use of ARC/INFO-ORACLE interface. INFO data manipulation facilities, which include the capability to cross-tabulate, can be used to produce various report tables that summarise the result of an analysis.

In a Geographic Information System (GIS), geographic information is not approached as a drafting task as in normal planning work, but as a database application. Among the advantages of such organization include minimising redundancy in data storage, providing central control of data access, ease of manipulation, keeping the integrity and security of the data base and making application programmes independent of the form in which data is stored (Rind, 1981; Rind and Green, 1988; Masser, 1988).

It is, as previously stressed, very important that the data be updated frequently. Aerial photographs, field surveys and official log of planning applications and decisions can be used as bases. The changes can be automated and added to the appropriate ARC/INFO coverages. UPDATE command can be used to merge new features through "cut and paste". ERASECOV command can be used to erase part of a coverage before adding updated features.

Organization of data is of the utmost importance in planning work. Data related to buildings, land use and land cover, among others, is organised within the Geographic Information System (GIS) so as to optimise the convenience and efficiency with which it can be used. The form of organization chosen will be influenced by the types of data and analyses to be performed and the methods used to encode the data. As a map is both a means of storing geographic information as well as a form of presentation, a means must be found to ensure accuracy as well as legibility. In a computer-based Geographic Information System (GIS), the level of detail is only limited by the capacity of its hardware storage capacity. Large coverage can be subdivided much in the fashion of map sheets, and stored as separate sets of data files, but in these, sub-units can be presented as one map with seams conveniently hidden.

Different types of thematic information of the study area are treated as different data layers in a Geographic Information System (GIS). When a coverage is needed for analysis, the map database is merged. MAPJOIN command can be used to combine the coverage into another and APPEND command can be used to merge the same feature classes from adjacent coverages.

CONCLUSION

For a study to be useful it must work within the strategic planning system that is already in place. However, the very nature of a strategic plan is dynamic. It must have the ability to be flexible and be sufficiently organic to make it "strategic" in the full sense of the word. To be that the plan will have to have a sound database which will allow across-the-board analysis of potentials, contraints and underlying patterns. As it encompasses a relatively long span of time, it must be able to update itself because of the changing situation. Geographic Information System (GIS) with its inherent ability to store, organize, retrieve and analyse data should be able to provide the planning system with this possibility. However, the system must not be used just to provide automation and discipline or rationalization to the existing planning system but it must be also used to bring into it the ability to take account and utilize the range of information on extrinsic and intrinsic resources that are available.

Presently Geographic Information Systems (GIS) are being used to better understand key socio-economic and environmental problems (Maguire, 1991). Because of its very wide variety of applications, the technology is also being used more and more as a tool in the search for the solutions of these problems. Inevitably this means that there are many different ideas about the nature and scope of GIS. It is however, best described as an integrated collection of hardware, software, data and liveware which operates in an institutional context (Maguire, 1991).

The most appropriate definition of Geographic Information Systems (GIS) is the one that takes into account the three main views of the technology, namely, the map, the database and spatial analysis. Central to these views is that Geographic Information Systems are a special case of information systems in general and that they share many features in common with other information systems. The key features which differentiate them from the others are the general focus on spatial entities and relationships, together with specific attention to spatial analytical and modelling operations. In a technical sense it is the ability to organize and integrate apparently disparate data sets together which make them so useful. The spatial searching and overlay operations are a key functional feature of Geographic Information Systems (GIS).

Despite its initial problems, the potential of Geographic Information System (GIS) as a tool for urban environmental planning appears to be very considerable. The strength of a Geographical Information System (GIS) lies in its ability not only to record large volumes of data, but also to inter-link this data in manipulative analyses. However, this ability is only as valid as the data and the analyses that are put to it. Therefore an understanding of the value and importance of each set of data and its interactions is of paramount importance.

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CHAPTER 5

CREATING AN URBAN LANDSCAPE RESOURCES INVENTORY FOR AN INTEGRATED URBAN PLANNING SYSTEM IN MALAYSIA: A PROPOSAL FOR KUALA LUMPUR OLD TOWN URBAN LANDSCAPE RESOURCES PLANNING MODEL (KULAND)

INTRODUCTION

Landscape planning articulates landscape values in the planning of any given area. In a densely built-up urban area with many historical and cultural dimensions such as Kuala Lumpur Old Town, landscape planning articulates not only the values but also the significance of these values in the face of pressure for change and development. As the Malaysian national strategic planning, popularly known as the "Vision 2020", has only allocated 50 years from 1971 for the nation to achieve a "developed nation" status, the pressure to develop urban sectors such as commercial, industrial and residential is very great (Chapter 3).[1] The dynamic nature of this urban development, puts a lot of pressure on the surviving urban landscape resources.

The situation above demands not only the search for suitable areas, but also other requirements incumbent upon such choice in order to have an environmentally sound development. Among the requirements is the need to have a means of projecting the impact of any proposed development on the resources and on the area as a whole. It is also important to have a means of monitoring the actual result of the development once it is implemented. The ineffectiveness of the existing planning mechanism perpetuates the piece-meal approach to development even within a strategic planning environment. In many cases these have led to the failure of the planning authority to safe-guard the interest of the public against the interest of the individual developer especially in cases involving contentious subjects such as the conservation of environmental and landscape resources.

The paradox of it all is that urban landscape resources have been traditionally recognized, or at least acknowledged, in the urban planning process, especially at the data collection stage. However, this has not been quite enough to influence the form and content of the plan eventually produced. This points not to the shallowness of such recognition, rather to the need for a mechanism to fully integrate landscape planning into the urban planning system. It is within this professional context that the current study is being undertaken.

It is assumed that the above points have been adequately stated and argued in the previous chapters so that their mention here is made solely for the purpose of a recapitulation. This chapter aims to develop a methodology whereby the identification, assessment and use of urban landscape resources may be fully integrated with the urban planning process to form an integrated planning information system. The objective is to develop a proper consideration of urban landscape resources that may subsequently influence the mainstream decision-making process of urban planning.

RELATIONSHIP BETWEEN URBAN LANDSCAPE RESOURCES MODELLING AND URBAN PLANNING SYSTEMS

In dealing with an established urban area such as Kuala Lumpur Old Town, one is actually dealing with a stage of the urban planning process that is a transition between strategic planning and operational programmes. Within a strategic planning system as adopted in Malaysia the former is normally called the structure plan, while the latter is generally known as planning control.[2] It is at the latter stage that most of the decisions affecting urban landscape resources are made. Miller, D. (1986) refers to this stage as tactical planning.[3]

In the ideal of Malaysian urban planning systems, the local plan which interprets the structure plan, provides the bridge between the strategic structure plan and the tactical planning level. The reality of the matter, however, is more complex than just slotting the term "local planning" at the level below "structure planning". The reason for this situation lies in the almost total reluctance of the planning authority to implement the "local planning" part of the system. As a result of this "official non-implementation" of a very important part of a statutory requirement, there is now a dominant use of non-statutory plans in Kuala Lumpur at the supposedly local planning level.[4]

Because they are not bound by any statutory requirements, implementation of, amendments to or non-implementation of the non-statutory plans or parts of them become a main feature of the planning system at the tactical level. This in turn makes constant negotiations always a feature of decision-making, either among fellow urban planners at intra-departmental level, with officials from related departments, the developers or the final decision-makers, resulting in what appears to be chaos. Because all the negotiation is done within a context of a prepared plan, albeit a non-statutory one, the environment may actually be described as that of "controlled chaos".[5]

Miller, D. (1986) describes the situation above as the most likely scenario at the tactical planning level. He is of the opinion that what seems to be "controlled chaos" is very conducive for the introduction of modelling process, so that the result of each protogonist's position in a negotiation may be assessed rationally. If he is right, then the seemingly imperfect Malaysian urban planning systems is ideal for the introduction of an urban landscape planning model (Chapter 3).

At the tactical planning level, an urban planner's task is the preparation of a plan. This task basically consists of three areas: problem structuring, evaluation and negotiation (Fig. 5.1). It follows therefore, that for a successful application of modelling at this level, the model has to be decision-centred in its approach; meaning that the model supports the decision-making process rather than makes the decision as is normal in an expert system approach. If modelling is successfully placed within a decision support context at the tactical level, a number of benefits can be expected beyond the simple generation of information. For example, the model is able to compare and contrast a few alternative courses of action. This capability facilitates the process of negotiation, as it is able to set more light on the positions of everyone involved in the negotiation.

Decision-making at the tactical planning level, when compared to strategic planning, is often viewed as being relatively well-structured. Well-structured decisions involve problems which are well enough understood to be characterised as routine and repetitive, with a widely accepted interpretation and measure of success (Mason and Mitroff, 1981).[6] While there is certainly a greater frequency of this type of decision at tactical levels, it is a mistake to assume that it dominates tactical planning. Such an assumption only leads to a faulty conclusion that decision support at this level takes the form of a simple information product, preferably with explicit rating or choice preference.

The type of decision-makings at the tactical level may appropriately be characterised as "semi-structured". This is because they deal with equally semi-structured problems. In this situation, there is a certain amount of strategic or policy guidance as well as sufficient information to define the nature of the problems being addressed during a decision-making exercise (Kean and Morton, 1978).[7] However, Mason, R. and I. Mitroff (1981) observes that these problems also display many characteristics of poorly-

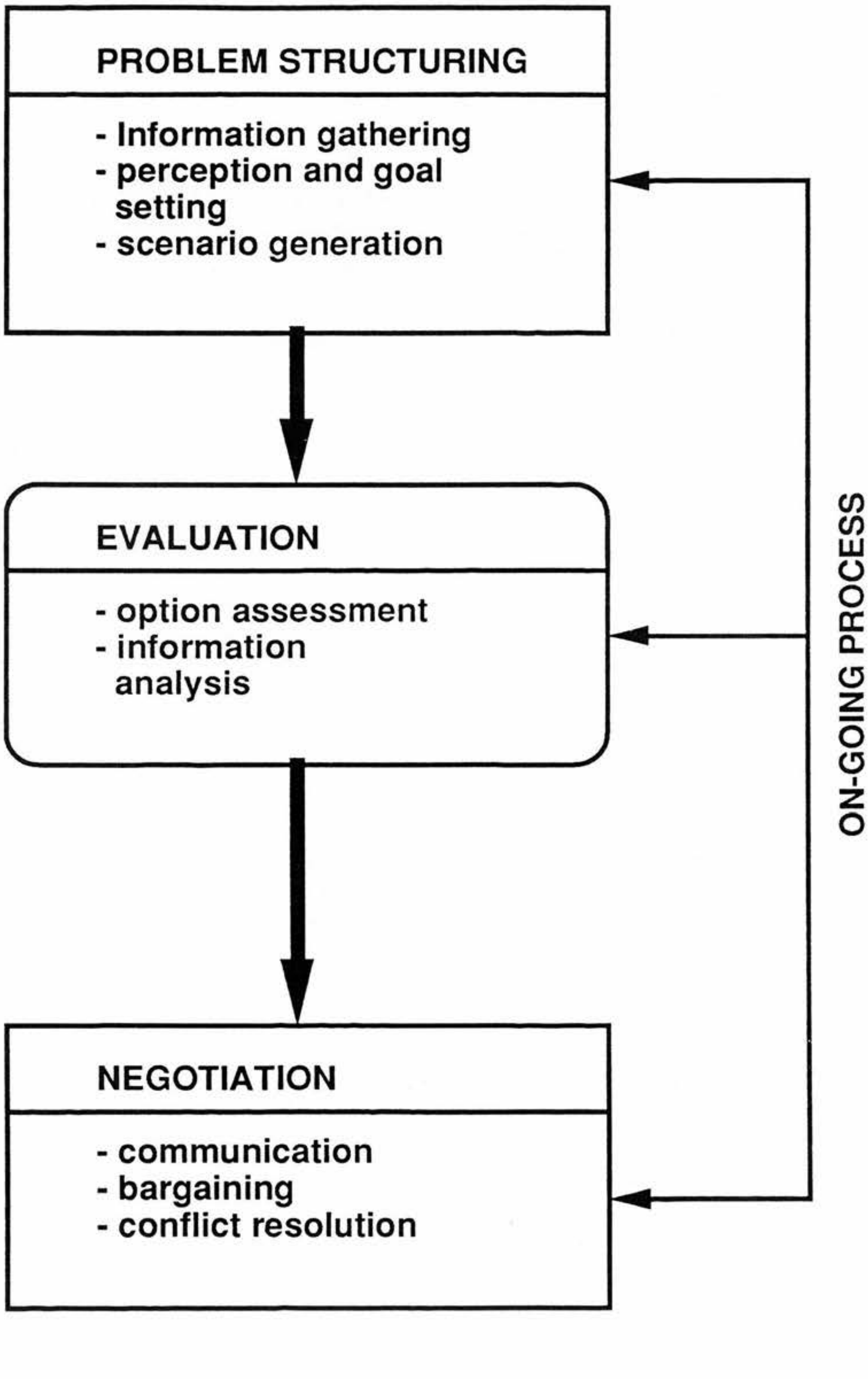

Fig. 5.1: A Simplified Schematic of Decision-Making Process
(Adapted from: Miller, D., 1986)

structured or "wicked problems" (Chapter 3).[8] This is because firstly, there are conflicting and competing interests creating a need for trade-offs within the same value system; secondly, there are dynamic and uncertain environments complicated by incomplete information; thirdly the problem can be seen in different ways depending on circumstances and individual or group perspectives and as a result, there is no definitive or absolutely correct interpretation; fourthly there is no single criteria system or rule to determine a correct outcome, and lastly there are social, organizational, and political dimensions which may be influential in the process.

The above observations lead to a conclusion that semi-structured problems do have sufficient structure for computer and analytical aids to be of value, but intuition, value judgements and creative responses are still essential; very much an ideal background for creative urban planning and landscape architecture. Accordingly the most appropriate form of model to enhance the influence of urban landscape resources within an urban planning process is not a typical expert system type but a decision-support system type.

The frequency of poorly-structured or wicked problems encountered at tactical planning level also leads to an argument that modelling should provide support at this level as modelling reduces the problems and realities to the very basics so that they may be better understood. It should be designed with the users (urban planners, environmental managers and decision-makers) in mind as they are responsible to interpret strategic policies at the local level. In many instances, their decisions are based on information external to their local tactical decision problems. Such people are not content to be told that a particular course of action is the best simply because a model says so. They need to understand the assumptions and construction of the model to understand the implications of a recommended course of action.

The purpose of using models for urban landscape resource planning is to make a positive contribution to how the resources are used, planned and managed. All of these are done in support of broader social, economic and environmental goals (Manning, E.W., 1988).[9] Accordingly a model must fit properly into the broader context of urban planning and is based on a number of premises. The first premise is that it is to serve the decision process either directly or indirectly in order to influence decisions; secondly the overall sustainability of life, production or environment is the ultimate goal of why one deals with urban landscape resources; thirdly priorities with respect to urban landscape resources are determined by the socio-cultural need of the general public.

Deducing from above, the reason for undertaking modelling procedures is because they aid us to: firstly understand better what is happening (for example, descriptive models); secondly to fill specific information gaps (for example, to interpolate, extrapolate, forecast, and predict); thirdly to demonstrate our understanding more effectively; and lastly to exert influence on the decision-makers.

Modelling urban landscape resources is basically modelling land. This is because it is landscape that provides the spatial contiguity for the land, that is, landscape defines land. Thus the distinguishing feature of urban landscape resources modelling is its focus on spatial contiguity as an organizing principle of an urban setting. Primary human experience is in a spatial matrix, and things that are tangible have a significant spatial component and meaning to them. It can therefore be concluded that urban landscape resources modelling involves distinctly tangible materials.

OBJECTIVES OF KUALA LUMPUR OLD TOWN URBAN LANDSCAPE RESOURCES PLANNING MODEL (KULAND)

It is assumed that the need for Kuala Lumpur Old Town to have a general conservation policy has been established in the preceding chapters. This does not mean that the aim of the model is to freeze development within it, rather so that its development will be more orderly than it is presently and that the interest of all its historical, cultural and environmental assets are fully taken into account. It is also assumed that the need for an overall, long term strategy to reverse the loss and deterioration of the urban landscape resources within Kuala Lumpur Old Town have also been equally established. The proposed model is therefore, aimed at aiding urban planning process to realise these objectives.

The model focusses on two primary sectors in the urban planning of Kuala Lumpur: conservation of urban cultural landscape resources, and the conservation of urban natural landscape resources. The main thrust of the model is therefore, to aid the existing urban planning process first by facilitating the urban planners and finally the decision-makers in these two areas of concern.

Conservation of urban cultural landscape resources aims at the major elements that form the character of the old town. Examples of these include the colonial shophouses, historical buildings, historical sites, and their respective environments. Since the threat to these features are mostly from individual private developers, the main thrust of the model is in helping the authority to identify and evaluate the resources that are likely to be affected by development from that source. To be effective the model must also be able to project the impact of a development on the overall environment of Kuala Lumpur Old Town.

Kuala Lumpur Old Town, like any other old town in Malaysia, is very much depleted of its natural urban landscape resources. It will therefore be extremely desireable to conserve those that have survived. It is equally desireable to conserve those resources that are already modified such as Kelang - Gombak Rivers Corridor so that they may, in the long term, recover much of their original character and amenity. The success of Singapore Urban Redevelopment Authority (URA) to restore Singapore River to a beautiful and almost natural state through long term strategic planning is a very good example in this case.[10] This success, incidently also points to the need for a comprehensive resource database as a basis of an information system so that it may provide an effective monitoring system for any development that may have impact on the river. It also points to the prospect of increasing the amount of urban natural landscape resources within the old town. It is therefore important that every development proposed within Kuala Lumpur Old Town be scrutinized, to determine whether it may in the long term contribute to reverse the lost and the deterioration of urban landscape resources through normal urban planning control.

ELEMENTS OF THE PROPOSED KUALA LUMPUR OLD TOWN URBAN LANDSCAPE RESOURCE PLANNING MODEL

With the two major objectives discussed above, the urban planning process for Kuala Lumpur Old Town must be quite different from that which is in operation for the other parts of Kuala Lumpur or the rest of the country. Accordingly, the model is proposed to consist of five parts (Fig. 5.2):

Part I: Creation of Kuala Lumpur Old Town Urban Landscape Resources Database

For a model to operate a database of the resources of the area must first be developed. This forms Part I of the proposed model. Basically, the model's database consists of some 13 main layers of data as follows: (1) a base map of

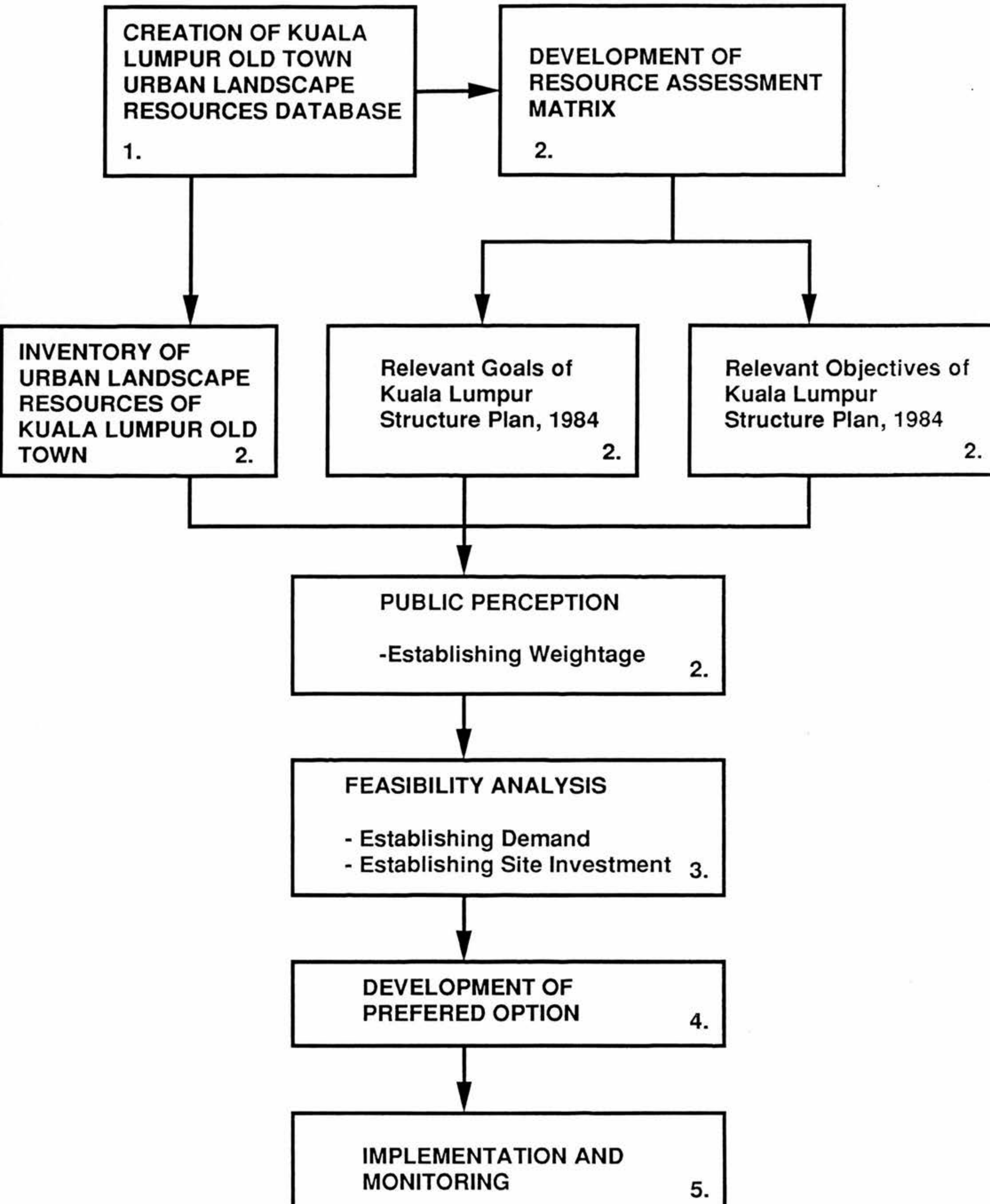

Fig. 5.2: <u>Proposed Kuala Lumpur Old Town Urban Landscape Resources Planning Model (KULAND)</u>

the area being studied; (2) parcel records; (3) buildings; (4) history and archeology; (5) land use; (6) vegetation and land cover; (7) soils type and relative disturbance; (8) ecology; (9) river and streams; (10) road and movement systems; (11) topography; (12) drainage; and (13) planning status; (Fig. 5.3).

The collection of data is planned to be as systematic as possible so as to ensure that all relevant information is being put into the database. As Aronoff (1989) said: "One can present information at a less detailed level than it was stored but cannot present more detailed information than exists in the database".[11] For this reason, all information is entered only once at the finest detail available. However, in the case of paper maps, separate maps are needed to show information at different levels of detail and at different scales.

There are problems related to the development and subsequent implementation of the Geographic Information System (GIS). The first major problem is related to the data. This problem is typical for developing countries, including Malaysia. Many factors conspire in this problem. Foremost among these is the data record system that presently exists with the relevant data holding authorities. Manual filing systems mean that the data is probably lying forgotten somewhere in some anonymous cabinets or those marked "miscellaneous" after a specific study and until another study comes up. The normal practice is to just do another data collection, with the assumption either that the data does not exist or is already out of date - rather than going through a miscellany of dusty brown papers. Over time some of the data is usually lost. The second problem is the quality of the data. This can be both in terms of its currency and its accuracy.

The last comprehensive collection of environmental and socio-economic data in Kuala Lumpur was done in 1980 when the Kuala Lumpur Structure Plan Study was carried out. No

COVERAGES	ATTRIBUTES
BASE MAP	. coordinates . tic points .
PARCEL	. Lot numbers . legal boundaries . legal area . ownership
LAND USE	. use type . land cover . status of usage
BUILDING	. building block . building type . facade type . height class . historic . architectural . age class . development status . building use
MOVEMENT	. road class . pedestrian way . bus stand . parking area . LRT route . aerobus route . bus route . street name (present) . street name (former)
TOPOGRAPHY	. elevation . slope . aspect . terrain / landform
VEGETATION	. vegetation type . land cover . vegetation class . historical coverage
SOIL	. soil type . relative disturbance . soil suitability
ECOLOGY	. ecological zone . wildlife habitat
HYDROLOGY	. river system . bank condition . pollution level . drainage network . discharge point .capacity . flood level

Fig. 5.3: <u>Landscape Resource Coverages</u>

other data collection exercise of similar scale after that is known to have taken place in Kuala Lumpur. Therefore in most cases the data available is almost invariably out-of-date. As for accuracy, quite a high standard was achieved in 1984, even though inconsistencies could be detected in some instances.

The availability of or rather accessibilty to relevant data may also be influenced by archaic bureaucracy. This may be in the form of an over-enthusiastic rigidity in the implentation of the Official Secrets Act (1985) by officials at every levels, or in an exhaustingly unwieldy data release system adopted by most government offices. All these problems are compounded by the fact that no one source holds all the data. Data on drainage and hydrology, for example, may be held separately by the Public Works Department and the Drainage and Irrigation Department. Even within one monolithic organization such as the City Hall of Kuala Lumpur, data related to open space and related uses may be fragmented between the Planning Department and the Parks and Recreation Department. When one type of data does exist in more than one location it invariably creates further confusion as to whose version is more accurate and current. Some of the above problems can only be solved by undertaking thorough and laborious file cross-referencing and field checks.

Once all the relevant data is acquired from the various sources, it has to be assembled and processed before it can become a useful and systemitized database. The following stages are considered as necessary in the development of the database: (1) updating of information; (2) digitizing of map information; (3) development of digital elevation data; (4) development of an attribute database for building units (Fig. 5.4). These are discussed in the following sections.

1) **Updating of Information**

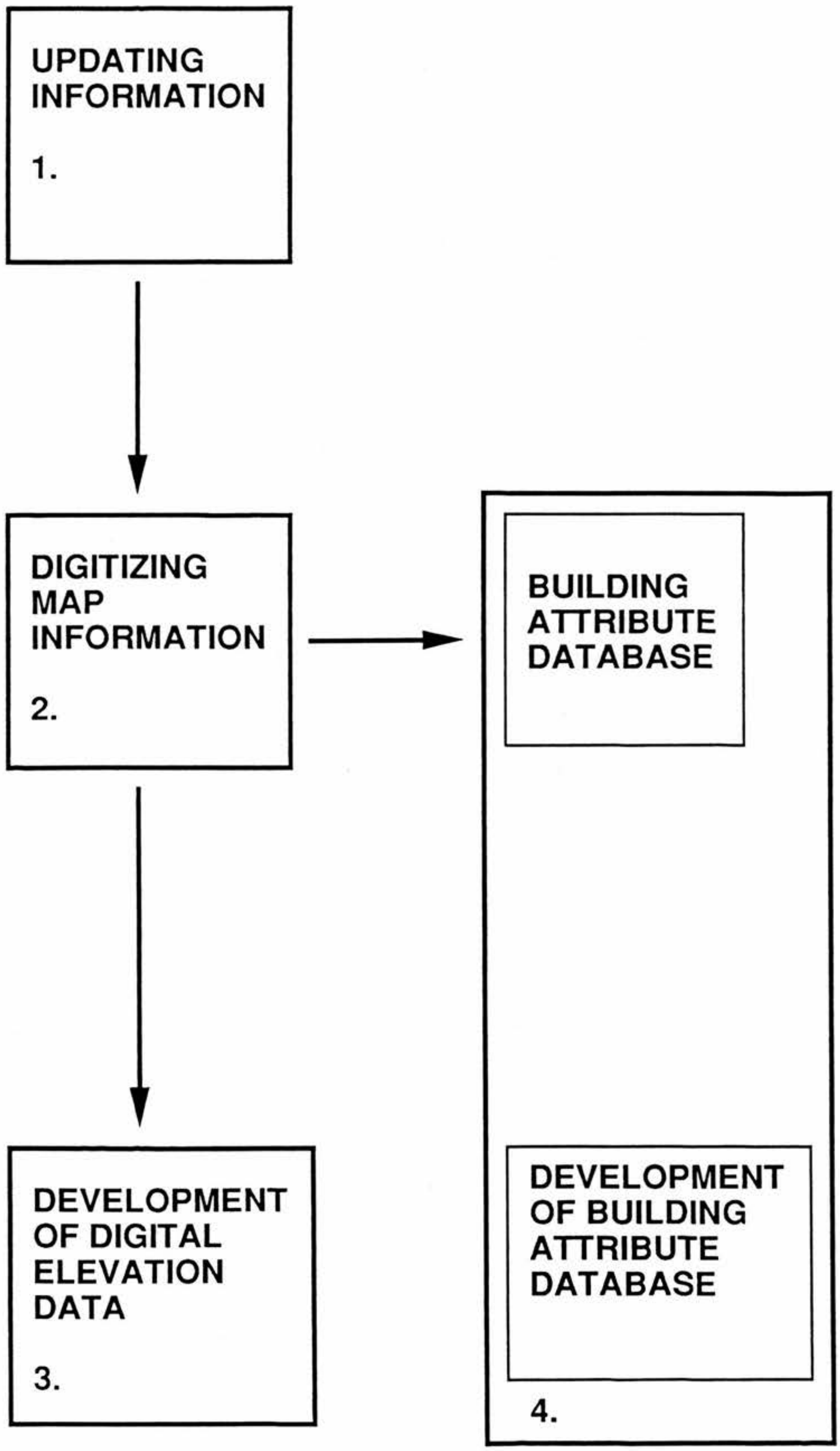

Fig. 5.4: Stages in the Development of Kuala Lumpur Old Town Urban Landscape Resources Data Base

As in many other countries, a planning exercise in Malaysia starts its data collection on a base map. The scales of these maps will depend upon the area that is being studied. An urban study such as the one considered here will normally use a map with a scale of 1 inch to two chains or 1:1584. These maps are prepared on the basis of a 1974 vertical aerial photographs (scale 1:5000) produced by the Directorate of Survey and Mapping, Malaysia. The maps are characterised by relevant information such as location of buildings (including annotation for important ones), terrain elevation (mostly in term of contour lines with important points such as hill summits accompanied by spot levels), road networks, river and streams, lot boundaries, lot numbers and the relevant State Plane Coordinates. These maps are not the best basis for any planning exercise as they are normally out-of-date because of the time involved in their production. Some critical information such as public facilities and utilities are also normally excluded or blanked-out for security reasons. The boundaries and sub-divisions are also usually not up-to-date. More critical than anything else, is the absence of relevant environmental information such as land cover and building height. In many cases, the recording of projects which are actually in planning approval stage within the main map without the necessary discriminating legend has led to a lot of confusion.

A large amount of cultural, physical and environmental data is required in an urban planning exercise. This data is collected from various sources, such as governmental records, aerial photograph interpretation and ground-truthing, old books, manuscripts and postcards, archives and museums. Land records such as land ownership, land value, status of tenancy are usually derived from documentary search of the files of the relevant department.

The process of updating the base map usually starts with checking the boundaries of the land parcels from the most up-to-date records from the City of Kuala Lumpur's Planning Department. Both the old plot boundaries and those in planning approval stage are sieved out onto different coverage as historical records and proposed development respectively. Building lines and road alignments are also recorded in much the same way. Aerial photograph interpretation is used to record land cover, vegetation, ecological zones, relative disturbance of soil and footpath. Important out-door structures, such as bridges are also similarly recorded. Extensive ground truth survey is carried out to check the currency of the information. Other information, for example soil type and suitability is extracted from the records of the Department of Agriculture, Selangor. Information relating to the pollution of the River Kelang and the River Gombak are taken from a five year record (1986-90) from observation stations installed and monitored by the Department of Environment. Hydrological data is extracted from the report submitted by the consultant to the Drainage and Irrigation Department.

Some of the data on the buildings was available and quite current because the Conservation and Urban Design Unit of the Department of Planning, Kuala Lumpur had carried out a building survey of colonial shophouses in 1987. It was only left for the author to do a field check of the individual buildings covered in order to update the information. To complete the information on the area, the author had to carry out a survey of every building and structure that was not included in the above survey. The purpose of these checks and survey were to establish: (1) building types; (2) facade types; (3) envelope materials; (4) building height; (5) building age; (6) advertisement and hoardings and (7) development status of the building.

Altogether there were 1484 buildings surveyed, including those on which the information only needed to be updated.

General information may be derived from traditional sources such as documentary and field surveys. Documentary sources include archival sources such as old photographs, books and reports to establish the recorded vegetation history of the area. Aerial photographs (1974) may be used to develop a rough vegetation map to form a base for a ground-truthing exercise such as was conducted by the author along the river and open spaces in May, 1991. A reconnaisance survey was also conducted on the Bukit Nenas Forest Reserve. The last two surveys were conducted with the help a professional forester from the Department of Forestry, Malaysia (DoF). A field survey to identify and list all the major street and open spaces trees was also carried out in June, 1991.

2) **Digitizing Map Information**

Data was entered by manual digitizing from the updated map sheets on a scale of 1 inch to 2 chains or 1:1584. These maps were based on the State Plane Coordinate. As the map was traced, the Geographic Information System (GIS) system (ARC/INFO) stored all the coordinates of the data for later processing. Nine separate sheets of map were digitized. However, by setting the coordinates earlier, the system actually stored the information as one merged map. The ARC/INFO digitizing and editing facilities (ARCEDIT) helped to minimise the effort of detecting and correcting errors.

Information is stored as coverages and forms the basis of data storage. Each coverage is a digital analog of a single map. Each coverage may have several features, termed class, present. Each feature class has locational and thematic information associated with it. For example, building coverage can have, among others, building condition, building type, building height, building facade, and envelope material as its features, termed attributes.

In other cases, the attributes of a coverage may involve changes in terms of the topology of the polygons as in the case of soil coverage where the features of soil type and relative disturbance may not necessarily coincide. In such cases, each feature will have to be digitized separately. Locational information may be represented explicitly, for example, as a series of coordinates on an x,y plane. Locational information can also be represented topologically, that is by its relationship to the coverage features or as a combination of other features. Coverage features are represented by both coordinates and topology. Coverage topology is created by using the CLEAN and BUILD commands.

3) **Digital Elevation Data**

In analysing the surface features of the site such as terrain, landform, and views, it is important to have a three dimensional sense of the site. This can be done by using digital elevation data. This data is a set of elevation measurements for locations distributed over the land surface. The case study of this thesis uses contour lines because they are the most common form of available elevation height for a relatively large area such as the study site.[12] Using Triangulated Irregular Network (TIN) data structure, the topography of the site can be viewed in three dimensional form from any angle, height, and scale.

The texture of the surface of the three dimensional model can also be modified according to the requirement analysis in examining details. All these functionalities are available through the VIEW command of TIN. Analysis on matters such as intervisibility, obstrusiveness, landscape absorbability are termed as viewshade modelling or viewshade mapping. This functionality is used to map areas visible from a specified scenic lookout. Its application to landscape analysis and planning is considerable.

A surface portrayed from a viewing position other than vertical is termed a perspective view. Perspective views are primarily a presentation tool. They are useful in showing the 3-dimensional context of features on a surface, such as a natural landscape. Whereas the vertical view tends to flatten the percieved relief, in a perspective view, the relief can be exaggerated to emphasize surface features. TIN uses a grid of regularly spaced lines called a mesh diagram to produce perspective views. A thematic map of features can be draped using DRAPE command over the view to give a 3-dimensional view of the landscape (Fig. 1.1).

4) **Development of the Attribute Database for Building Units**
Landscape is made up of all features and structures on a site. In urban areas, the buildings define external spaces due to their contiguity and adjacency. The buildings form the character of external spaces with their shapes, texture, colours and alignment. External fittings such as advertisement hoardings, and covered walkways, verandah or awnings contribute to the overall character of an area. When an area is a relatively old one such as Kuala Lumpur Old Town, rows of period buildings provide the basis of district or street characterisation. Some buildings are imposing because of their sizes; either in terms of spread or height.

For detailed planning, data of features mentioned above should be collected. It is most essential that this data be stored in a way which allows easy retrieval and manipulation. It is necessary for example to find out which buildings are of special interest because of their facades, colours or historical associations, when an urban renewal or conservation program is being undertaken. All the above features relate to each of the buildings, thus are attribute data. Each building can have more than one attribute. A fundamental characteristic of the ARC/INFO system is that all the cartographic or spatial elements (polygons, lines and points) are linked to an associated database of attributes. These attributes are carried throughout all stages of the analysis. It is possible to update the attribute data in all ways; addition (ADDITEM), reduction (DROPITEM), or even changing attribute class (UPDATE).

All the information above is arranged using a relational data model and stored in files called "directories". In the computer file listing, these are identifiable with a suffix of.DIR. Examples of these are KLU.DIR representing land use coverage and KBG.DIR representing building coverage. These are stored in the ARC part of the programme. Each of the directory file is normally accompanied by attribute files, called PAT (Polygons Attribute File) or AAT (Arc Attribute File). These are stored in the INFO part of the programme.

Part II: Development of Assessment Matrix

The database just described is basically a collection of raw data. Its usefulness to draw up general development policies can only be derived from analyses done on it to retrieve useful information. In this case the information required is mainly related to the quantity, quality and distribution of landscape resources. An assessment of their usefulness to the overall planning process depends on their relevance to the issues being considered. An identification matrix is developed to aid the analysis. There are two components of this matrix: strategic planning and functional classification components.

The first component addresses the strategic concerns, expressed in the Kuala Lumpur Structure Plan, 1984. Aspects of the public concerns about the overall emphasis on environmental resources and impact are also considered here. While the former recognises the strategic importance of the urban landscape resources by the structure plan, it also translates them into practical statements of concern.

This is done both at the goal and objective steps so that all aspects of concern by the strategic plans are being considered. Both the goals and objectives are translated into respective sets of "operational criteria". The purpose of doing this is to translate them into objective evaluation checklists to facilitate the identification of each urban landscape resource.

The second aspect should be seen as a way of updating the first, with the current public concern on urban environmental issues. This is very important firstly because the structure plan is now almost a decade old and there have been some important changes in the concern of the public about urban landscape resources. The second reason is to rationalise the balance of concern on urban landscape resources that seems to be incomplete in the structure plan as pointed out many times in the previous chapters. This is done by developing a weighting system that reflects the relative importance of the respective urban landscape resource from the perspective of the members of the public (Appendix 2).

Relevant Goals and Objectives of Kuala Lumpur Structure Plan, 1984

Four out of the total of 10 goals of the Kuala Lumpur Structure Plan, 1984 have some relevance on the future of the city's urban landscape resources. These goals and concerns are translated into points in a scoring system. They are listed and discussed individually below:

1. Goal No.3:

"To facilitate the establishment of Kuala Lumpur as the centre for the promotion of national culture and religion and for the projection of the desired image of Malaysia".

Consensus of the three major communities in the Federation of Malay States at the time of independence in 1957 was that the Malay culture, being the culture of the natives of the Malay Peninsula, would form the basis for the formation of the national culture of the country.[13] The most important part of this culture is Islam as the national religion. What this translates into is that any building or structure or landscape that reflect this aspect of the culture such as mosques, buildings with "Islamic" characters such as those with Moorish architecture surrounding the Padang, and compound gardens, are recognized as reflecting this culture. It is interesting to note that even the colonial rulers recognized this aspect. This is reflected by the architecture and designs of many of the government buildings and civic projects carried out during their rule.[14]

However, the government recognises that Malaysia is a multi-racial, thus a multi-cultural society. The Federal Constitution recognizes that while the national culture is based on indigeneous culture, it is being enriched by elements of the immigrant cultures. It is therefore very important that this diversity of cultures is reflected in the national culture of the country. In the urban landscape resources term, this is expressed clearly in the built fabric.

Operational Criteria:

The resource:

i) projects clearly the national culture

ii) identifies certain components of the national culture

iii) identifies an historical event within the formation of the national culture

iv) symbolises the multi-cultural origin of the national culture

v) promotes the national religion

vi) symbolises the freedom of faith and religous tolerance in an Islamic country.

2. Goal No.7:

"To provide adequate amenities and facilities for the social and physiological well-being of the city's population taking into cognizance the need to socially integrate the various community groups".

This goal is concerned with the social needs and quality of life of the city's population. It involves the provision of public utilities, recreational and community services through properly designed lay-outs and integrated programmes to ensure accessibility. This part of the goal when translated into urban landscape resources, includes the provision of a pollution-free urban environment, with as much space for recreation as possible. It also means the needs for urban landscape resources that will always remind the population of their cultural continuity.

The second part of the goal is concerned with what has always been almost an obsession with every Malaysian, that is, social integration among a very diverse and cosmopolitan urban population. This is because it is the contention of many that only through social integration can a truely united Malaysian society emerge. In urban landscape resources terms, this is translated as the elements that will encourage interaction, inter-communal co-operation and common identification.

Operational Criteria:

The resource:

i) provides social amenities to the city's population

ii) provides social facilities to the city's population

iii) provides opportunities for social interaction between various communal-based groups of the city's population

3. Goal No. 8:

"To achieve the best possible physical structure and arrangement for Kuala Lumpur and to be supported by an efficient transportation system".

This goal is concerned with the size and structure of the City Centre, of which the old town is a very vital part, and the rest of the city and its conurbation and their inter-relationship. The structure plan is very concerned with the need to conceptualise the future physical structure of the city and its evolution.

The second part of the goal emphasises the need for an efficient public and private transportation system for the city, and especially within the City Centre, thus the old town and including the needs of the walking public.

Operational Criteria:

The resource:

i) provides clear definition of edges to the old town

ii) provides visual identity to the old town

iii) provides visual links to the fabric of the old town

iv) provides visual links and coherence between parts of the old town

v) has the quality of evolutionary order of the development of the old town

vi) attention to the provision of an efficient urban transportation system.

4. Goal No. 9:

"To secure the most feasible environmental standards through a judicious balance between development, ecology and national heritage".

This is, perhaps, the most important goal in as far as urban natural landscape resources are concerned. The structure plan recognises the deterioration in the urban natural landscape resources as the result of indiscriminate development such as destruction of trees and natural features. It therefore recognizes the need for policies to stop activities that lead to further loss of such resources. It is only the inconsistencies of the policies that negate the conservation effort.

The second part of the goal is concerned with national heritage. There is no direct definition of this term in the structure plan but the commentary following the statement of the above goal implies the meaning here as "the buildings that have historical and/or architectural interests".[15]

Operational Criteria:

The resource has:

i) ecological values

ii) natural landscape values

iii) unique landscape values

iv) heritage values

v) national cultural values

vi) cultural value related to any component of the national cultures

Relevant Objectives of Kuala Lumpur Structure Plan, 1984:

Another major component of the resource identification system are the relevant objectives of the Kuala Lumpur Structure Plans, 1984. Objectives are supposed to translate the more abstract goals into more tangible statements, thus there is a fear that considering the objectives may duplicate the assessment exercise unnecessarily. However, the objectives of the Kuala Lumpur Structure Plan, 1984 are actually listed and arranged according to sectoral plans, such as City Centre, Transportation, and Townscape. As such, rather than duplicating, they may strengthen the system by covering every part of the plan's concern. The objectives considered relevant are listed and commented according to sectors:

1. **TRANSPORTATION SECTOR**

a. Objective No.3:

"To improve the quality of life in the Federal Territory (of Kuala Lumpur) through protection and enhancement of urban environment".

The objective is directed toward the achievement of a transportation system where there is minimal disturbance on the environment, either through air, visual and noise pollution or through the expropriation of parcels of land on which urban landscape resources exist.

Operational Criteria:

The resource has:

i) the quality of reducing hazards from the heavily motorized urban transportation systems

ii) a landmark quality to give direction to travellers within the old town

iii) the identity-giving quality to create a sense place

b. Objective No.4:

"To develop a transportation system which is compatible with or supports other urban, industrial and social development goals".

As in the previous objective, in urban landscape resource terms, this objective is aiming toward co-existence between good transportation network and the need to conserve and enhance urban environment of which urban landscape resources are the main components.

Operational Criteria:

The resource has:

i) the ability to co-exist in harmony with the transportation network

ii) the quality to enhance the transportation network either visually or functionally

c. Objective No.6:

"To promote an energy-efficient total transportation system".

An energy-efficient transportation system is a transportation system that will promote efficient use of fuel, thus minimizing environmental pollution and in long term helps to conserve the surviving natural landscape resources.

Operational Criteria:

The resource has:

i) the ability to absorb pollutants created by the transportation network

ii) the quality to withstand the rigours of the transportation network.

2. **PUBLIC UTILITIES**

a. Objective No.3:

"To ensure that all public utility programmes are implemented in a well co-ordinated and integrated manner"

This objective is directed toward a planned implementation of public utilities programmes. Unfortunately at present this is done quite haphazardly, resulting in undue disturbances to the environment. It is also directed toward better use of resources, such as former tin mining pools as retention ponds in the flood mitigation schemes and the proper use and maintenance of the river system instead of turning it into a huge open sewer and monsoon drain.

Operational Criteria:

The resource:

i) has the quality of "tying" the urban fabrics of the old town

ii) has the quality of absorbing utilitarian uses

iii) is resistant to obstrusive adjacent uses.

3. **RECREATIONAL FACILITIES**

a. Objective No.1:

"To provide and achieve the best possible arrangement of open space and recreational environment and to accommodate demand for leisure time activities".

Against a figure of 2-3 hectares per one thousand population found in many European cities, there is a dismal ratio of 0.4 hectare of open space per one thousand population in Kuala Lumpur now.[16] The figure is definitely much lower for Kuala Lumpur Old Town. Recognising that this figure shows an extremely acute shortage of open space and recreational facilities, the structure plan aims to redress this situation by recommending that all existing open space be maintained, that new ones be created but more importantly that others and for other purposes be made available. Among the areas mentioned are the river reserve corridor and vacant space created by abandoned or dilapidated shophouses. This objective is very important in maintaining and perhaps even increasing the stock of urban natural landscape resources within Kuala Lumpur Old Town.

Operational Criteria:

The resource has the potential of:

i) providing functional open space for the city

ii) "doubling-up" as recreational spaces.

4. **LANDSCAPE, TOWNSCAPE AND CONSERVATION**

a. Objective No.1:

"To promote a high standard of environmental amenity in terms of townscape and landscape".

This is, perhaps, by far the most important objective as far as urban landscape resources are concerned. Not only is "landscape" being stressed but it also refers to the townscape, which the author has classified as a part of urban landscape resources. The result of this objective will be the proper planning, conservation and maintenance of most of the urban landscape resources.

Operational Criteria:

The resource enhances:

i) the quality of the townscape of the old town

ii) the general landscape of the old town

iii) part of the character of the old town

b. Objective No.2:

"To attain an environment which is free from the major forms of pollution".

Among the concerns of this objective is the physical deterioration of vacant and left-over land and dilapidated shophouses and other buildings. It is also directed toward the use of urban landscape resources as mitigation elements against major urban pollution such as atmospheric, soil, water and noise pollution.

Operational criteria:

The resource has the ability:

i) to reduce any major form of pollution

ii) to provide a form of hazard control

c. Objective No.3:

"To maintain a judicious balance between development, ecology and national heritage".

This objective is concerned with the deterioration of natural environment as a result of development. It is also concerned about the well-being and maintenance of buildings that has become part of the national heritage such as historical buildings or buildings that provide the temporal landmarks in the evolution of the Malaysian urban culture.

Operational Criteria:

The resource has:

i) the ability to absorb development

ii) ecological value

iii) unique contribution to the balance of built and non-built environment

iv) conservation value.

5. **CENTRAL PLANNING AREA**

a. Objective No.5:

"To promote a better and more efficient system of movement so as to minimize vehicular and pedestrian conflicts and congestion"

This objective, if realised, means the segregation of vehicular and pedestrian traffic. In a very cramped and intensely built-up old town, this may means the need to rethink the current traffic management of the area. Partial pedestrianisation or a series of one-way street traffic management may help to reduce the pressure on urban cultural landscape resources such as the colonial shophouses with their narrow streets and lanes.

Operational Criteria:

The resource may:

i) to create buffer between vehicular and pedestrian movement systems

ii) direct the vehicular and pedestrian movements within the old town

b. Objective No.6:

"To enhance the environmental quality and visual amenity of the city centre which will not only befit its image as the National Capital but also ensure amenity for the city users (population) and visitors".

In its commentary to the above objective, the structure plan observes that the image of the National Capital is not being served well by the colonial shophouses as they do not present the image of development, modernisation and native culture of the country.[17] However, in Goal No.3 the plan recognizes the need for the presentation of the multi-cultural origin of the national culture. Nothing can be more appropriate than these colonial shophouses to present the case and image of multi-cultural society. It is therefore extremely important that the above objective be translated into efforts aimed at conserving these symbols of the origin of Malaysian urbanization.

Operational Criteria:

The resource creates:

i) a sense of place within the old town

ii) a visual series as the user moves along the movement system

iii) the landmarks of times in the evolution of the old town.

Public Perception

The next factor that has to be taken into consideration in the identification of urban landscape resources is the peoples' perception of their importance. In Malaysia, while there is now a lot of concern for major elements of landscape resources such as open spaces, roadside trees, remnant rainforest and historical buildings, there seems to be little direct concern for others such as natural revegetation of former mining land, or revegetation of abandoned parcels of lands within the shopping areas (Appendix 2). However, the trend toward a generally more educated society holds a promising prospect of improvement of a much better degree of environmental awareness among the population. The concern of the general public may be translated into the following list in term of order of perceptual importance (Table 5.1):

a) Category I:
Major Natural Landscape Resources
Major Historical Buildings / Structures
Sites of Historical Importance

Category II:
Buildings of Cultural Importance
Urban Open Space / Squares / Plazas

Category III:
Natural Revegetated Shoplots
Former Mining Lands

Category IV:
Secondary Natural Landscape Resources
Secondary Historical Buildings / Structures

Table 5.1: **Perception of Importance in Decending Order**

Functional Classification Component

The second part of the model (KULAND) deals with the categorization of all urban landscape resources within Kuala Lumpur Old Town. This involves creating an inventory of all urban landscape resources that have been identified through the first part above. The resources are grouped into 2 (two) basic components: urban cultural landscape resources, and natural urban landscape resources.

a. Creation of an Urban Cultural Landscape Resources Inventory:

Adapting a classification system adopted by Taylor, K. et. al (1992), five categories of cultural urban landscapes resources are defined as:[18]

i) **Historic Scene:** This may be a limited-sized or micro environment where certain events of local history have taken place. Such places are frequently associated with structures or tangible remains. Such scenes promote understanding and interpretation of events, ideas or persons associated with the landscape. An example of this scene in Kuala Lumpur Old Town is the Market Square (Fig. 5.5).

ii. **Historic Site:** A site where an activity or event has imbued a particular piece of ground with significance that warrants preservation of its historic appearance. The most obvious example of historic site in Kuala Lumpur Old Town is the landing spot of the pioneers of Kuala Lumpur in 1857 (Fig. 1.2)

iii) **Historic Designed Landscape:** A landscape where the form, layout and/or designer are the primary reasons for

Fig. 5.5: <u>The Market Square</u>: An example of an historic scene. The town expanded out from this square around which Yap Ah Loy built his townhouse and a gambling den. Indian merchants gradually replaced the Chinese as the main traders around the square.
(Source: Tate, M.D.J., 1987)

significance. An example of such landscape is the famous Padang. The Padang not only has a form and layout which is historic, but it also evokes the past simplicity of urban life during the founding years of Kuala Lumpur. It also brings to mind the many incidences that were related to it; from its notoriety as a public execution place during the short span of Japanese occupation during the Second World War to it as the place where a new country saluted its independence at the stroke of the first minute of 31st August, 1957 (Fig. 2.10).

iv. **Historic Vernacular Landscape:** A landscape possessing a significant concentration, linkage or continuity of natural and man-made components which are united by human use and past events or aesthetically by plan or physical development. Style, workmanship and land use management techniques tend to be typical of particular groups or historic periods, rather than unique or innovative. There are very few examples left of this landscape due to historical events as discussed in the earlier chapters. However, there are now major elements of urban landscape character which are modelled on vernacular architecture such as the Bank Bumiputra Headquarters and its small compound (Laman Bumiputra) (Fig. 2.15).

v) **Historic Ethnographic Landscape:** A landscape characterised by its use by distinct ethnic groups that have added cultural imprints on the landscape. Its significance is derived from human interaction or consumption of natural environment. An example of this type of landscape would be the whole of Kuala Lumpur Old Town which is generally an immigrant Chinese settlement. However, a more detailed observation of these areas points to a more complex situation. There are certain sub-areas where other communities had left their marks. Indian traders and money-lenders have managed to displace the Chinese since the early 1900s in the area around the Market Square, along the Market Street and along Tuanku Abdul

Rahman Road (Batu Road), while the Malays still retain a foot-hold on the tongue of land on which the Jame' Mosque is situated. Lastly, although the British are the main moulders of the urban morphology of Kuala Lumpur Old Town, the landscape that could be attributed directly to them are only the Padang and the congregation of missionary schools, convent, and church at the foot of Nenas Hills.

In identifying all the elements of urban landscape resources, indicators such as types of buildings, types of facades, age of buildings, building materials, building uses, associated historical events are very important. All these particulars are surveyed and stored in the INFO files and would be retrieved during the analysis.

b. Creation of a Natural Urban Landscape Resources Inventory:

The next functional component of the second part of the model is the natural urban landscape resources inventory. Natural urban landscape resources are those landscape resources that are basically in their natural form of existence. These can be individual items such as trees, rivers, and water bodies. They can also be defined in groups, for example, a forest stand, or a field of shrubland, or wetland or a corridor of natural area either left over by development, or a granitic intrusion in the form of an undisturbed hill.

Natural landscape resources that have been altered by human intervention either intentionally or unintentionally but still retaining, on the whole, their natural characters, are also included in this category. Examples of the former are the various open spaces or gardens and the latter are the river corridor, the former tin mining land or natural revegetation within abandoned and vacant areas.

Part III: Feasibility Analyses

The third part of the model is the assessment of development feasibility of a particular resource. This can be gauged from the demand on the resource concern and level of investment required for its development. Two main items may be included in this analysis:

a. Establishing the Level of Demand

The first item is a projected demand for a proposed development. It is important that its proposed role and function within an overall context of the area be understood at the outset of the analysis. In a highly developed urban centre such as Kuala Lumpur Old Town, roles and functions may vary. A nature reserve, for example, may have functions at many levels such as an open space for its immediate neighbourhood, a zonal open space for a zone of the city (in this case the Central Zone) or it may even be a "special open space" for the whole city or the country.[19] Knowing this role makes it possible to estimate the amount of demand that is going to be for the proposed development.

Each of the above roles may be measured by using the various functions of the ARC/INFO. A study of the existing types of green space within the area may be carried out using a simple items retrieval operation of a NEIGBOURHOOD function. This information may be plotted on a map using ARCPLOT. It may be possible to identify those that are already adopted officially as open space and those that are not from the INFO file. The proximity of a similarly designated open space may then be worked out if one does exist. If however, there is none that exist, then the task of justifying a proposal may depend on the need for it according to the overall objectives of the structure plan. Alternatively, the existence of a habitat of special interest may in itself justify the creation of a nature park. This type of habitat is likely to attract the more sophisticated tourists, schools and local researchers.

The proximity of the site to the generators of the various types of demand can be quite crucial in the calculation of its feasibility rating. For example, a site surrounded by a highly developed commercial cum residential area may generate a lot of demand in term of visitors and users.

Kuala Lumpur Old Town has some provisions of typical town centre open spaces, but it does not have any that is based on natural habitat. It would be very useful to develop this concept as most of areas left over from developments within the old town are areas that are relatively small and/or in locations where such management is probably the best option available, for example infill areas, the river landscape corridor and the wetland of the former tin mining land.

b. Establishing Site Investments

The next part of feasibility analysis is specific for a proposed site. Feasibility is a measure of the amount of effort needed to turn the site to the form and characters required by a development proposal. In socio-economic terms within the normal urban planning system, these "efforts" are known as "investments". Investments may already exist to the advantage of the sites. These may be in the form of an existing road and other communication facilities, that may need to be just upgraded, and with possible cost saving. A site may also have existing facilities such as unused government bungalows that may be converted to new uses within an overall development proposal. This in itself may count as an element of feasibility.

Part IV: Development of the Preferred Development Option or Plan

The fourth part of a proposed model would be the development of a preferred option for the development of the area. Various options that take into consideration the results of all the earlier analyses would have to be considered.

Strategic and tactical development policies regarding the conservation of urban landscape resources within the boundary of Kuala Lumpur Old Town may be formulated to reflect the various mix of options available. It is only natural that a particular conservation or development policy may apply only to a certain section of Kuala Lumpur Old Town. This is because different aggregations of urban landscape resources have different mixtures of the resources. At macro-level, policies may be developed to conserve the macro characters of a particular zone, and by extension, the whole of Kuala Lumpur Old Town. Accordingly, policies that are developed at micro-level may be aimed at conserving the characters of a specific urban landscape resource.

To decide a set of policies an evaluation of the options has to be carried out. This may be done using a benefit and cost analysis and goal achievement matrix which means that a reference to the earlier part becomes imperative. It is in this type of analysis that Geographic Information System (GIS) should be useful as once goals and objectives are translated into operational criteria and using the simple Arc Macro Language (AML), analyses may then use the various operations of the programme such as NEIGHBOURHOOD, OVERLAY, and STREAM analyses.

Part V: Implementation and Monitoring

The above case is in a situation where the originator of the project has the luxury of choice of sites to be selected from and in most likelihood is the local authority itself. However, in most cases, there is no such luxury. A proposed development, especially if it originates from the private sector, is normally constrained to basically a single site. In this case the authority is responding to an application for a planning permission from members of the public, and the situation is not as straight forward as above. In most cases, the originators of such application will not be too keen to let the authority know the exact magnitude of the impact of their projects on the environment and urban landscape resources of the area and its surrounding. Unless the planning authority already has some form of database, it may not able to verify the environmental impact statement carried out on behalf of the project originator by some consultants. Such is the case of the City Hall of Kuala Lumpur.

For the purposes of this study we have adopted the database of urban landscape resources that has already been built earlier. This part, therefore, concentrates on the development of an impact analysis procedure to assess the suitability of a development proposal put forward in a planning application. The procedure is proposed to be as follows:

1. **Preliminary Checks**

A few steps are needed as the preliminaries of this part:

a) **Establishment of the Boundary**

The first step to take when receiving a planning application is to check the boundary of the proposed development. By feeding in all the co-ordinates of the points of turns of the boundary into an already established coordinates coverage of the area, one would be able to check the exact location of the proposed development in relation to the overall area using an OVERLAY function. Basically this involves overlaying the proposal on the existing parcel coverage to verify the boundary. This check is very important to establish a common reference for the following steps.

b) **Establishing Land Ownership**

It is very important that genuine land ownership be established from the beginning. In Kuala Lumpur, due to a cumbersome land record system within the Land Office and the Planning Department, there are cases where developments are carried out on government lands or lands where the developers do not have legal right of occupation.[20] For obvious reason, these incidents seldom happen on land which is privately owned. The procedure of establishing land ownership may easily be done by referring the lot number to the INFO file of the ownership attribute through Land Parcel Coverage (File KLP). If genuine ownership is not established, then the process should be suspended until the originator of the development is able to convince the authority that he/she has legal right to develop the land.

c. **Establishing the Existing Conditions on Land Use**

Development may mean changes in land use, intensification or otherwise of the present use thus affecting the use zoning, use density or plot-ratio designations. A check of the proposal against the Existing Land Use Coverage (File KLU) map on ARCPLOT should indicate the present use of the land concerned. It may also be possible to establish the use density (Item UD) and plot-ratio (Item PR) designations that are in force on the parcel with relevant INFO files. The INFO report may be requested on whether there are any discrepancies or not.

2. Development Impact Analysis

The last part of the model test whether or not a proposal is environmentally sound. It investigates the possible impact of a development proposal on the urban landscape resources of Kuala Lumpur Old Town. To systematise the procedure, impact assessment is done on two major groups of urban landscape resources: cultural resources and natural resources.

a) **Analysis of Impact on Urban Cultural Landscape Resources**
Most of the development that take place within the boundary of Kuala Lumpur Old Town involves some alterations or modernization of existing buildings. In many cases, demolition of existing buildings may be necessary to accommodate a proposed development. It should be possible to check all the related attributes of the existing buildings, for example the building types (Item BT), facade types (Item BF), historical importance (Item HB), and building conditions (Item BC) from the Building Coverage (File KBG). The check is necessary to see whether the development affects those attributes in any way. A report may then be requested from the INFO files.

The impact of the proposed development on the site and its surrounding is also a very important aspect to analyse. A redevelopment of a shophouse, for example, involves not only the particular shophouse but also the block of which it is a part of, the street and the zone it is located in. By comparing the proposal to the informations that exist in the database using the retrieval function of ARC/INFO, one should be able to examine the magnitude of changes or impact that such development would bring about.

A check may also be made on all other elements of urban cultural landscape resources such as bridges and monuments. This is to find out whether they are in any way affected by a certain proposal, for example road widening projects and other traffic rationalization exercises. An example of this may be seen in the case of Munshi Abdullah Road bridge which is now a twin bridge.

b. **Analysis of Impact on Urban Natural Landscape Resources**
Some of the development within the boundaries of Kuala Lumpur Old Town is bound to have some impact on urban natural landscape resources. There are basically two types of impact on these resources: direct and indirect. The direct impact are those that accrue from direct

displacement, contact or other physical adjacencies with the proposed development. Indirect impacts are those that are affected in more complicated ways as part of chain reactions to certain activities.

NEIGHBOURHOOD operations of the ARC/INFO are used to evaluate the impacts of a development upon its surrounding. In using the NEIGHBOURHOOD operation, three basic parameters have to be specified: one or more target locations, a specification of the neighbourhood around each target, and a function to be performed on the elements within the neighbourhood. In analysing the impact of a proposed development on an area, the target of the analysis is the development itself. The neighbourhood is the range of distance from the development that the impact is probably felt. The functions to be performed are according to the demand of the particular analysis, such as counting the resources affected according to categories, area affected or quality of an area for specific use like wildlife habitat.

A "BUFFER" analysis may be used for the first case. A buffer is an area of specified width drawn around the element of which the impact is being measured. There are cases where one would like to know the impact of physical distance of a development on the existing urban landscape resources within an area. "BUFFERing" with various widths should show the magnitude of the impact accordingly.

In analysing the quality of a particular site for an intended specific use, a more complex analysis may be required. There are a few qualities that a development needs. A development of a nature park, for example, needs an area with a certain degree of existing natural resources including luxurious and varied native plants cover, existence of wildlife, existence of interesting natural features such as streams and springs. A Geographic Information System (GIS) analysis should be able to retrieve from the database areas with such resources and overlap them to show areas with multiple resources. A planner may then identify from the map areas which have the potentials for such development. By short-listing those that have the most potential according to a set of established criteria, he may then be able to proceed with the detailed selection procedure.

3. Recommendations

Lastly the KULAND model may be used to make several options on the proposal in question. It may recommend that the planning application for a project be approved, or approved with conditions or rejected. The recommendation is in accordance with the findings of the impact analysis on the urban landscape resources within the area concerned. It may also refer to the guides from the conservation zones plan and the conservation policies specific to each urban landscape resource that may be affected.

As planning decisions are taken, the database may be updated to record the decisions. Monitoring to ensure the development is carried through within a stipulated time and conditions can then take place. Another update of the database may be made once the development is completed, so that there will not be any confusion in the future. The UPDATE facility of ARC/INFO can easily handle this task.

CONCLUSION

One of the first benefits of using a model such as KULAND should be that it encourages individual and organisational learning. As Hunt and Sanders (1986) argued, learning is both a fundamental descriptive feature and a normative objective of decision support system development.[21]

Firstly, the learning can occur when a model makes a decision-maker or user think explicitly about utilities and trade-offs, thereby improving problem structuring. The use of a model such as KULAND to evaluate tactical planning strategies or policies for a particular urban landscape resource would require the construction of a weighting policy set. This would compel those involved in the decision process to think about the basis for the conservation decisions as well as the relative importance of the components which form the evaluation system.

Learning may also occur when the model allows user-based sensitivity analysis and exploration. In being able to test the implications of decisions, a decision maker can explore a wider variety of options and improve the search function. The use of KULAND would allow various policy weights and criteria to be tested to explore their implications on the stock of urban landscape resources. Greater weight, for example, could be given to the presence of rare resources and species and the resulting output examined to determine conservation priorities from such a perspective.

A third situation when learning may occur is when the model encourages organizational learning and communication through coordination and information sharing. The construction of KULAND would require the sharing of information to develop the database and rating codes. It may be necessary to involve several in-house departments within the City Hall of Kuala Lumpur and external organizations such as the Forestry Department of Malaysia (DoF), the Drainage and Irrigation Department (DID), and the Department of Environment Malaysia (DoE), in the construction of the policy set. It is therefore highly desireable that the system be centralized and managed by a special unit within the City Hall of Kuala Lumpur.[22] Not only will this set up be administratively easy to manage but it will leave the planners, landscape architects and all the other users free to use the system only when it is necessary. At the same time, the system operators may developed friendly user interfaces such as interactive models that allows those with very little knowledge of computer operations to derive the maximum benefit from the system. The operators will not only function as consultants but their skill will provide in-house trouble-shooter teams for the users. They will also be able to maintain the database without apparent bias to certain uses, thus keeping the credibility of the data.

Finally learning should occur when the model improves the functional knowledge of those involved. The process of building and using a model like KULAND would require those involved to develop a good understanding of all urban landscape resources concerned, thereby improving their functional knowledge of them, their values and overall environmental role.

The next benefit of using a decision support system model is likely to be contribution to the negotiation process. Decision-making in tactical planning is rarely an individual activity. In most cases, bargaining or negotiation occurs at some point in the decision process. The model should provide a common language and, through the policy set, some objective criteria. Secondly it should enable the participants in the negotiation to focus on interests in order to operate the model. Rather than expressing a position, a model such as KULAND should require consideration of policy weights which essentially express the interests of those involved. It should also be possible to test the implications of the values and interests held by other participants in the process, and potential compromise could be quickly explored and tested.

In final analysis, modelling should be able to play an important role in tactical planning. To exploit this potential fully, models should be constructed as decision support systems using decision-centred design approaches. In this context, the contribution of modelling may be seen in such benefits as the encouragement of learning and improved negotiation, rather than the generation of a single "correct" or optimal decision.

NOTES:

1.Even though Vision 2020 was proclaimed by the Prime Minister of Malaysia, Dr. Mahathir Muhammad, in 1991, it incorporated the period of the New Economic Policy (NEP) (1971 - 1990). The period between 1991 - 2020 is called the New Development Policy (NDP). It set as its biggest target the achievement of a "developed nation" status for Malaysia by the year 2020 AD. In many economic forums, Malaysia is now already being classified as "newly industrialised country (NIC)" along with Taiwan, Korea, Singapore and Hong Kong. However, due to political reasons, the government is not willing to accept the designation just yet, at least until a substantial proportion of the industries are indigenous.

2.And the United Kingdom too.

3.Miller, D. (1986), Land Modelling in Tactical Planning: Potential Use and a Decision-Centred Approach, in Gelinas, R., D.Bond and Smit (1988), **Perspectives on Land Modelling**, Polyscience Publications Inc., Montreal, Canada, p.59

4.Town and Country Planning Act, 1976 (Act of Parliament No. 172).

5.These are normally senior civil servants headed by the Mayor, who himself is an appointee of the central government.

6.Mason, R. and I. Mitroff (1981), **Challenging Strategic Planning Assumptions: Theory, Cases and Techniques**, John Wiley and Sons, New York.

7.Quoted by Miller, D. (1986), Op.cit., p.60

8.Miller (1986), Ibid, p. 60

9.Manning, E.W. (1986), Models and the Decision Maker, in Gelinas, R., D. Bond and B. Smit (eds.) (1986), Ibid, p.3.

10.Lim, J.J.L. (ed.)(1991), Planning for the Singapore River, in **Skyline**, Urban Redevelopment Authority, Singapore, p.2. Other related articles in the same journal are: Preserving a bit of History along the Singapore River (p.4), Metarmorphosis of Singapore River (p.6), A New Lease of Life for the Singapore River (p.8), From the Crystal Ball (p.10) and A New Vision to be Realised: An Invitation for Public Participation (p.10)

11.Aronoff, S. (1989), **Geographic Information Systems: A Management Perspective**, WDL Publications, Ottowa, p. 192

12.Another form of measurement is the spot heights which then will be transfered into lattices.

13.The Federation of Malay States was commonly known as Malaya. The three major ethnic groups in Malaya, are Malays who are the natives of the country, and the immigrant communities of Chinese and Indians. After merging with the former British colonial territories of Sarawak and North Borneo (Sabah) and Singapore in 1963, the country is now called Malaysia.

14.The most celeberated case of this was when C.E. Spooner, the State Engineer and finally Sir Frank Swettenham, the first Resident-General of the Federated Malay States, intervened directly in the design of the State Secretriat (Sultan Abdul Samad Building) in 1894. The first design presented by the Public Works architect, A.C. Norman, was probably a classical facade in the Renaissance tradition of the West. See M.D.J. Tate (1987), p.28.

15.City Hall of Kuala Lumpur (1984), **Kuala Lumpur Structure Plan, 1984**, Kuala Lumpur, p.9

16.Ibid, p. 144

17.Ibid, p.181

18. Taylor, K. (1992), **Conservation and Interpretation Study of the Rural Heritage Landscape of the Lanyon-Lambrigg Area, Australia Capital Territory (ACT)**, an unpublished seminar paper given on a lecture tour at Edinburgh University, pp. 3-4.

19.Administratively, Kuala Lumpur is being divided into 5 zones: North-western Zone (Kepong / Jinjang / Pencala / Damansara), North-eastern Zone (Gombak / Setapak / Wangsa Maju / Datuk Keramat), South-eastern Zone (Maluri / Bandar Tun Razak / Cheras / Sungai Besi), South-western Zone (Bukit Jalil / Seputeh / University of Malaya) and Central Zone (all areas within the outer ring road including the area of Kuala Lumpur Old Town).

20.The cases of large rubber refining works at Bandar Dalam Road, Gombak and a fire-crackers factory in Selayang were classical examples. Despite the stench and pollution it created, the illegal status of the former was only discovered during the Kuala Lumpur Structure Plan Study, 1984 and the latter after a tragic fire that killed a number of workers and residents of the surrounding housing area (Selayang Village). To make the matter worse, the real operator of the latter was found to be Taiwanese staying in Taipei, Taiwan.

21.Hunt, R.G. and G.L. Sanders (1986), Propaedeutics of Decision-making: Supporting Managerial Learning and Innovation, in **Decision Support Systems**, Vol. 2, pp. 125 - 134.

22.Yaakub, A. (1992) came up with similar conclusion after a study of a squatter planning in Kuala Lumpur.

CHAPTER 6

IMPACTS OF CURRENT URBAN PLANNING SYSTEMS IN MALAYSIA ON URBAN LANDSCAPE RESOURCES IN KUALA LUMPUR: CASE STUDIES

INTRODUCTION

It may be helpful to recall that while the Federal Territory (Planning) Act, 1982 (Act 267) was used to "legalise" the 1984 Kuala Lumpur Structure Plan, since its adoption, no local plans have been adopted using that same act of parliament for any parts of Kuala Lumpur, even though the life span of the structure plan will expire in 1999. It is worth noting too that the mandatory five-yearly review of the structure plan as required by the same law has not been carried out. Thus the planning decisions on individual planning applications for any part of the city are being based on general interpretations of the adopted structure plan, and in an increasing number of cases on unadopted local plans. In the case of the area within the former 93 sq. kilometres area of the city, that is the old municipality area, the old Comprehensive Development Plans No. 1039-1041 continue to be used as the general guideline. The "legal basis" for this use lies in the designation of the old plans as the "Interim Development Plans" when the structure plan was being prepared. When the structure plan was formally adopted, the use of the old plans was continued initially for a supposedly short period until the local plans could be drawn up and formally adopted. Because of this, the Comprehensive Development Plan No. 1039 (Central Commercial Area) is still the interpretive plan for Kuala Lumpur Old Town. What this actually means in a practical sense is that the planning system which controls the development within Kuala Lumpur Old Town is largely unaffected by the changes to strategic planning system of the structure plan.

In normal circumstances, an interim development plan is however only valid for the duration of the preparation of a local plan and for a year following, while waiting for legal adoption. In the absence of an adopted local plan, any other interpretive plan is a non-statutory plan upon which there is no obligation on the part of the planner or the planning authority concerned to adhere to. These plans are documents for internal consultation and/or co-ordination of the various units of the urban planning department. There is no obligation to consult or even inform the public on the preparation or adoption of a non-statutory plan. They may be used as a guide in what Bruton, M. (1992) called the "bargaining process" with the public but are certainly not binding on them.[1] These non-statutory plans or parts of them accordingly may be modified at the discretion of the planners. This may be done after consultations between departments for example in the fortnightly Town Planning Committee II (TPCII) Meeting of the City Hall of Kuala Lumpur.[2] Developers normally accede to the planners' insistence on the strict adherence to the non-statutory plans in order to secure prompt planning approval. In fact in many cases they would basically adopt any proposals from the planners. If planners take the urban environment seriously, which unfortunately they do not seem to always do, then the positive effect of this practice is that the planning authority can safe-guard the urban environment by advising the developers in such a way as to ensure good planning. However, this type of advice is not only dependent on a planner's commitment but also upon the availability of accurate and up-to-date data with easy means of interpreting it. The Planning Department of Kuala Lumpur unfortunately cannot rely on one and does not have the other. There are also cases where certain developers, especially those with political, or royal patronage or big corporate bodies seem to have such strong influence as to dictate to the planners.[3]

The lack of public accountability within the non-statutory planning systems means that there is no check on these practices and their results are only apparent after the development has been carried out and too late for objection in safe-guarding the environment. In many cases, these practices have led to a general degradation of the urban environment and of urban landscape resources in particular.

This chapter will illustrate by examples the impact of the existing planning system on the scarce urban landscape resources of the city. The examples chosen are firstly Bukit Nenas Forest Reserve and the Kelang-Gombak Rivers Corridor to represent the urban natural landscape resources and secondly the colonial shophouses and historical buildings to represent the urban cultural landscape resources. All three, as we shall see, suffer from the same difficulties.

As has been alluded to earlier, Bukit Nenas Forest Reserve is exceptional in being a remnant of the tropical rainforest completely surrounded by the concrete of a fast growing city. When the city is actually a national capital of one of the fastest growing economies in Asia, the exceptional character of Bukit Nenas is even more remarkable. However, the fact that the economy is growing very fast also makes the continued existence of the forest reserve daily more tenuous.

The Kelang-Gombak Rivers Corridor is proto-typical because most of the major cities and towns in Malaysia are either situated on one bank of a river (for example Kota Bharu, Kuala Terengganu, and Kuantan) or a river passes through them (for example Ipoh, Johor Bahru, Malacca, Alor Star and Kuala Lumpur).[4] In most cases the rivers that run through or by these urban centres are also as neglected as the Kelang-Gombak Rivers of Kuala Lumpur.[5]

Kuala Lumpur without its colonial shophouses and its historical buildings, especially the Moorish style government buildings surrounding the Padang would be hard to imagine. They are essential relics of Kuala Lumpur's past and contribute not just character and colour to the old town but also epitomise its richness and cultural diversity.

The one common reason that justifies the selection of these three elements of Kuala Lumpur's urban landscape resources is that the existence of all of them as we know them today is under threat from so-called "development" and "modernisation". It is, therefore, very important that we set controls on proposed developments and within the limitations of this study examine their impacts on the urban landscape resources concerned. Steps undertaken in the evaluation process generally follow the model presented in Chapter 5. However, technical details of the process are summarised in Appendix 8.

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

Located on the north-east of the study area (see Location Map on Figures 6.1 - 6.14, and refer Appendix 13 for its relation with the rest of Kuala Lumpur), Nenas Hill (Bukit Nenas) embodies a collection of very important urban landscape resources of Kuala Lumpur Old Town. Together with the Petaling Hills and Damansara Hills, it provides not only topographic character, but also a very important visual and natural landmark to the town. However, while the other two case study localities are almost completely built-up with houses and other buildings, Bukit Nenas continues to provide a green skyline to the densely built-up area surounding it. Very important historical buildings and sites are also found on the hill. Its most important asset, however, must be the remnant rainforest of Bukit Nenas Forest Reserve which is the oldest forest reserve in the country (Figure 6.1).

The threats to Bukit Nenas Forest Reserve come from three different sources. The first is from existing

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

VEGETATION ZONES

FIGURE NO: 6.1

LEGEND

- EMERGENTS (HIGH INCIDENCE)
- EMERGENTS (LOW INCIDENCE)
- MACARANGA SP. DOMINATED
- FICUS SP. DOMINATED
- PALMS (HIGH INCIDENCE)
- BAMBOO DOMINATED
- MELASTOMA & WOODY SHRUBS
- IMPERATA SP. DOMINATED
- MUSA SP. DOMINATED
- ORNAMENTAL PLANTING

N

SCALE: 1:5000

File: VGNANAS.AML

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

Source: Aerial Photograph, 1974 and Ground Truth Survey, May, 1991 development on adjacent lands; the second is from a proposed development on the remainder of the adjacent lands; lastly from a proposed development of an eco-tourism park on the site itself:

Threats from Existing Development on Adjacent Lands

The forest reserve falls within what has now become popularly known as the Golden Triangle of Kuala Lumpur; a name derived from the up-market and exclusive hotel-cum-commercial and office developments taking place within the area.[6] The first sign that the area surrounding the forest was coming under pressure from private development was when two commercial buildings were constructed in the early 1960s on the forest's southern boundary, just on the edge of the old commercial centre. The first was the 20 storey American Insurance Association (AIA) Building which used to be the only highrise building of any size in Kuala Lumpur Old Town until the mushrooming of others beginning in the mid-1970s (Fig. 6.2, see also Fig. 2.4A). It used to house the American Embassy, thus its notoriety as the only building in Kuala Lumpur that has any history of hostage taking by the notorious Japanese Red Army in 1975. The AIA Building was among the first major products of local architects trained overseas after World War II. This fact probably gives credence to its conservation. Next to the AIA Building is a multi-storey carpark (Fig. 6.2), having no architectural significance except for the ugliness created by its volume.

With the upsurge in the economy in the late 1970s, new commercial developments were taking place within the Golden Triangle area. Six of these high impact developments share the hill with the forest reserve. Among these are two international hotels (Shangrila and Merriot Hotels), four office blocks (Wisma Atrium, Wisma Supreme, Wisma Kim Seah and Panaromic Realty) (Fig. 6.2, see also Fig. 6.19A). In total, the developments cover an area of 3.65 hectares.

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

N

SCALE: 1:5000

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

EXISTING & PROPOSED ADJACENT DEVELOPMENTS

FIGURE NO.: 6.2

LEGEND

- MIXED DEVELOPMENT TO COMMERCIAL
- SCHOOLS TO COMMERCIAL
- PROPOSED RESIDENTAIL CONDOMINIUM
- EXISTING COMMERCIAL
- EXISTING HOTEL & OFFICE
- FOREST RESERVE

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

Source: Dept. of Urban Planning, DBKL, 1991
File: DVNANAS.AML

Even though all these developments took place just after the adoption of the Kuala Lumpur Structure Plan in 1984, planning approvals for them had already been given before the study was undertaken. All of them are multi-storey buildings, designed in the architectural style of regional internationalism.[7] While the office blocks were built on parcels of land formerly occupied by residential bungalows, the hotels were actually built on a tongue of forested land that formed the eastern slope of the Nenas Hill, thus a strong indication of the vulnerability of the forest reserve and the short-sightedness of the planning authority concerning a unique natural landscape resource of the city. As may be seen on the ground, the hotels and office developments block important views to the green hill. The details of this visual impact may be assessed by using ARCTIN intervisibility analysis. The most important impact of these developments was however, the trend they created within the immediate area adjacent to the forest reserve. Pressure for similar or complementing developments especially in neighbouring privately-owned parcels of land adjacent to the area presently occupied by bungalows, old shophouses become inevitable. In a chain of reactions, the pressure to redevelop the land presently occupied by the historical missionary schools for commercial uses will increase. Finally the forest itself is not safe from commercial pressure because unlike the Holyrood Park of Edinburgh, which is surrounded by mainly residential development and which already has a conservation policy in place, Bukit Nenas Forest Reserve is sitting right in the middle of a very busy commercial district of Kuala Lumpur where conservation is still a mystical word.

Threats From Proposed Development on Adjacent Lands

Missionary schools are among the oldest occupiers of the hills (Fig. 6.2). The most important of these in terms of area covered is the Bukit Nenas Convent. It was established in 1900 with a relatively large area of 1.85 hectares. Situated just below the convent is the St. John's Institution and its church. Next to the church is the headquarters of Talikom Malaysia.[8] Except for the last, all these developments took place during the founding years of Kuala Lumpur itself, making them very much part of the city's history.

Kuala Lumpur Structure Plan, 1984 had recommended that the schools be relocated on the fringe of the city and that the vacated sites be converted to new and up-market commercial development (Fig. 6.3) (DBKL, 1984). There were two main reasons for this radical proposal. The first was the daily traffic congestion created by the schools as most of the children are from relatively well-to-do families and so come to school in their respective family cars. The second and the more important reason was the perceived high land value of the area being made uneconomical by the schools and their related uses. The general land value in the area was about M$200.00 per sq. ft. in 1976.[9] Given the speculative activities going on since then, the land value is probably thrifled that figure now. It was the considered opinion of the land economist within the structure plan study that this type of land should not be for non-economic uses such as schools or recreation. The recommendation of the structure plan was, therefore, only a rationalization of the growing trend and demand for commercial development within the locality.

The economic reality of building new schools, as much as the opposition led by the churches and respective alumni groups had put the relocation process on a hold, even though there are indications that the proposal may be carried through. In fact the construction of a multi-level underground car park under St. John's Institution's football field started in 1992 might be seen as a prelude to this development.

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

SURROUNDING DEVELOPMENT

FIGURE NO.: 6.3

LEGEND

- HOTEL
- OFFICE
- CONDOMINIUM
- PROPOSED COMMERCIAL (EXISTING: MIXED)
- PROPOSED COMMERCIAL (EXISTING: SCHOOL)
- COMMERCIAL (EXISTING)
- PARKING
- CHURCH

N

SCALE: 1:5000

Source: Simulated with data from Department of Urban Planning, DBKL
File: ADJDEV.AML

Compiled by Ismawi H. Zen on ARC/INFO, September, 1993

This is a typical example example of a "wicked problem" that the planners have to face in their daily task (see also Chapter 3). The first impact of the development would be the loss of at least three very important historical buildings, namely the Bukit Nenas Convent, the St. John's Institution (Secondary School) and St. John's Institution (Primary School) (Fig. 6.2, see also Fig. 2.4A). The Church of St. John would, in most likelihood, be kept as relocating it would result in untold damage to a jealously guarded tradition of religous tolerance in the country.

The next impact of the proposal will be the gradual encirclement of the forest reserve by highrise commercial blocks; the view of the hills from the south will be blocked, the access to the forest reserve will be restricted, and finally the vegetation and wildlife of the forest will be adversely affected. Because of the lack of fundamental research and good quality data, it is difficult to forecast exactly the extent of the damage that may be done but the near total isolation of the forest through increased commercial activities on its periphery will certainly discourage external factors that are important for the sustenance of the forest such as the pollinating Fruit Bat (<u>Chironax melanocephalus</u>) from visiting the forest reserve.

As mentioned earlier, the proposed redevelopment of the school into a commercial area and the existing hotel cum commercial office development on the eastern fringe of the forest reserve would attract similar or complementary developments and pose further "wicked" problems. There is now a proposal to build a residential condominium on privately-owned lots of land next to it (Fig. 6.2). The lots are presently occupied by some dilapidated colonial bungalows. Such was the wild nature and remoteness of the site in the 1950s that one of the bungalows used to house the headquarters of the Department of Aborigines' Welfare, Selangor.[10] The proposed condominium aims to benefit from both the proposed eco-tourism park and the adjacent commercial development. Tacit approval for this type of development was given by the Kuala Lumpur Structure Plan, 1984. However, the processing of the planning application was temporarily held up because of public objections to this type of development in some other parts of the city. Public furore resulted in the personal intervention by the prime minister in May, 1991 suspending the processing of the planning application for this type of development any where in the city until after a thorough review has been carried out.[11] However, the strongest points of public opposition usually concern breaches of personal privacy in the low-rise housing areas by the high-rise condominium blocks and also deviation from the stated density policy of the Kuala Lumpur Structure Plan, 1984. As these are not issues at Bukit Nenas it is highly likely that this development will be given planning approval once the moratorium is lifted. If this is to happen then the development will only increase the problem of traffic congestion in the area - the one problem the planners want to resolve. Not only that, as will be seen, the full effect of these "developments" will have very grave consequences for the Bukit Nenas Hills and the forest reserve.

Adjacent to the proposed condominium is an almost vacant lot except for a row of very dilapidated shophouses (Fig. 6.2). On this lot, there is now a proposal for a commercial development which has already been approved by the City Hall of Kuala Lumpur. In complete contrast to the existing style, the development is to be of up-market type, which means that it will be housed in super-modern commercial buildings. One result of this and the other developments above is that almost the whole stretch of the eastern boundary of the forest reserve, will be blocked by highrise buildings. The hills which have provided a green and refreshing skyline will be crowded out by concrete towers.

Using the OVERLAY function of the ARC/INFO, it will be seen that the proposed developments above will be taking a total area of about 11.63 hectares, almost the same size as the forest reserve. Using INFO, the breakdown of the area proposed to be developed may be tabulated (Table 6.1). It will be seen that if these development are to go through, then in simple statistical terms, 6.03 hectares of presumably well-maintained landscape (Bukit Nenas Convent and St. John's Institution) with history going right to the founding years of Kuala Lumpur and a further 5.60 hectares of maturing semi-natural landscape will be "lost". Seen from a cultural conservation point of views, the projected loss of the historical school buildings is even more unpalatable.

Present Development	Proposed Development	Area (Hect.)	%
Bukit Nenas Convent	Commercial	1.85	15.91
St. John's Institution	Commercial	4.18	35.94
(Dilapidated Bungalows)	Condominium	2.28	19.60
(Dilapidated Mixed development)	Commercial	3.32	28.55
TOTAL (Hectares)		11.63	100.00

Table 6.1: Proposed Developments Adjacent to Bukit Nenas Forest Reserve

It will be seen that these developments will change the character of the area from a vegetation dominated to a concrete dominated area. The proposed developments will be in complete contrast visually and functionally with the forest reserve. Presently adequate data is unavailable to forecast their impact on the wildlife of the area, but it is safe to assume that it will be enormous. Another consequence of the development will be to turn the forest reserve into just another ordinary urbanised space a grave loss to the overall stock of natural landscape resources of Kuala Lumpur Old Town.

Using GIS to carry out a simple spatial analysis, the total area of the proposed developments may be mapped and its area calculated (Fig. 6.3). By doing this, a series of impact polygons are generated. For this analysis, information on the masses, volume and detailed design lay-out of the development proposal is necessary. A generalised impact on the plant and wildlife species may then be calculated through a simple overlay operation involving the generated impact polygons and the vegetation and wildlife coverages. If the relevant detailed data, such as ancient exotics and native species, including wildlife, within the compounds of the schools and dilapidated bungalows and shophouses, have been collected and stored in the GIS database, then the analysis will give the first indication of plant and wildlife species that may be displaced by the development.

At the next level of analysis a more detailed information of the impact may be sought. A GIS "stream search" analysis may for example be used to map and calculate areas that may experience increased surface run-off as a result of the proposed development (see Appendix 7). Here, a Digital Map-based Hydrologic Modelling System (MAPHYD), a GIS model that interactively simulates the flow of surface run-off based on average gradient of a surface, may be used (Johnson, L.E., 1989).[12] In order to carry out this analysis, the area of the hills is first divided into cells of say a hundred metre square. Detailed information on the type of soil, slope and land cover will indicate the erosion coefficient of the each cell, which subsequently will enable the amount of eroded material to be calculated, based on monthly average rainfall. This part of the analysis will indicate areas most likely to experience different degree in term of severity of erosion. An overlay operation at this stage with a vegetation map will indicate areas where plant-life are most at risk. Further overlaying the generated map that shows the area covered by the surface run-off, in turn with a map showing the detailed surface configuration of the area such as depressions and flat areas, and a map showing plant species or communities that are likely to trap the eroded materials, it may for example be possible to identify and estimate areas that will be most affected by sedimentation. If the database has been fed with detailed information pertaining to the geographical distribution of the plant species, GIS may aid this stage of the analysis by calculating the number of each plant species that may be suppressed by being in the areas most likely to be affected by sedimentation. In fact, GIS may give further details of this information by showing the sedimentation areas in a range of depth. It will then be able to supply the analysis with a cross-tabulation of sedimentation areas and plant species, enabling an informed judgement as to the relative seriousness of the problem arising out of sedimentation. This is provided the planner first has an understanding of the critical depth of sedimentation beyond which the plant species may not be able to survive.

A further stage of the above analysis also needs detailed information on the habitat of important indicator wildlife of the forest reserve, such as the Dusky Leaf Monkey (Presbytis obscura), or the Mousedeer (Tragulus kanchil), known and mapped. An overlay operation involving the erosion map, the sedimentation map and the map of indicator animal's habitat may indicate the areal impact of the development on the animal. An interpretation of the real impact as to whether the fragmented habitat left, first by the development, then by the erosion and sedimentation it caused, will be enough to sustain the animal concerned will depend on knowing the characteristics of the animal's minimum viable area, such as the minimum unbroken land size, which itself may be determined by other factors including the minimum number of plant species the animal is dependent on within it, the width of buffer with "development" and adaptive capability of the animal. This study is unable to carry out this part of the analysis as fundamental research on the habitats and life-style of the animals known to exist on within the forest reserve does not exist. If this information is known, the GIS may be able to aid the detailed impact analysis by giving statistical breakdown of every resultant polygon including the polygons where sedimentation or the development itself overlapped with the habitat polygons and the polygons where non-overlap occurs. It may then be assumed that in areas that correspond to the polygons that do not meet the necessary criteria of the minimum viable area, the impact is considered detrimental to the sustenance of the animal concerned.

The next GIS analysis that may be carried out is the viewshade analysis of the forest reserve with the proposed development simulated on it. This will give an indication of the extent of "screening" of the forest reserve by the proposed commercial and condominium blocks. The most important data needed here are the heights, masses and volumes of the buildings. Together with the existing contour data, and using ARCTIN, a series of intervisibility analyses may be carried out to map areas of the forest reserve that may not be seen from the normal sighting route, that is, the roads on the eastern and southern peripheries of the hill. A similar analysis from the north and west will reveal whether the proposed development will actually have any further visual impact, for example replacing the green skyline with concrete towers. Given the availability of accurate data mentioned above, one should be able to draw a conclusion as to whether the proposed development adversely affects the objective of the 1984 Kuala Lumpur Structure Plan, to retain the present skyline as a natural landmark providing the city with a sense of place and form (Goal no.8 and Objective no.6). Even though this looks like a foregone conclusion, as of the moment, it is not possible to make an informed judgement because of the lack of adequate data and relatively poor three dimensional presentation of ARCTIN which drapes the building plans over the 3-D ground surface. Further analysis will have to be taken over by a more powerful tool in this field such as CAD or LANDCAD. As both these systems are incompatible with ARC/INFO used in this study, this entails building another set of database and is therefore beyond the capacity and the scope of this present study.

Threat from Proposed Changes to the Management of the Bukit Nenas Forest Reserve

There are two developments still functioning within the forest reserve. The first is the international telecommunication tower on the top of the hill. This tower was built in the early 1960s and was further upgraded in the late 1970s. At the time the tower was built, there was no consciousness about its impact on the skyline in the city. In fact, it would be true to say that it was meant to be conspicous as a sign of the newly independent country's advance into the modern telecommunication world.

The second development sited within the forest reserve is Kuala Lumpur City Hall's artificial waterfall, designed very much in the fashion of Halprin's famous water-cascade (Fig. 6.4). It came complete with lighting and a huge logo of the City Hall of Kuala Lumpur and is located on the western slope. For the most part it was built with textured and ruggedly formed concrete in complete contrast with the sublimity of nature behind it. It is located on a steep slope at a point just above the junction of two of Kuala Lumpur's busiest streets, namely Dang Wangi Road (Campbell Road) and Ampang Road, for maximum effect, cynically parading the authority's insensitivity in "developing" a part of one of the most valuable urban landscape resources

Fig. 6.4: <u>City Hall's Artificial Water Fall</u>: Cynically parading the authority's insensitivity to the need to conserve a unique urban landscape resource.

of the city. A reason given for constructing this monstrosity is an "implied directive" from a prominent politician who was facinated by a similar feature he saw on one of his overseas trips. The fact that this "development" was actually carried out by the guardian of the city's environment unwilling or unable to protect such an important resource in the face of a certainly misguided scheme, indicates the perilous and uncertain fate of all landscape resources in Kuala Lumpur. By implication the situation is even more desperate for other less recognised resources, such as pockets of wetlands and reed-beds.[13]

There was an earlier attempt to "develop" the forest reserve itself. In 1972, the Urban Development Authority (UDA) sought to promote the site as a tourist resort.[14] A few years later the project failed for lack of patronage by the general public. The development consisted of a dozen brightly painted and air-conditioned chalets. These chalets were sited on the steep eastern slope of the forested hill facing the heavily trafficked Sultan Ismail Road for maximum exposure. A cable car system ran from a base station at a point on the same road and traversed every side of the hill, enabling the passengers to have a panoramic view of the city and valley below. It also made a stop at a hill-top restuarant for those who wished to spend more time on the top of the hill. A series of steep concrete steps and metalled ramps connected the base station and the hill-top restaurant, challenging the adventurous.

The failure of a potentially attractive scheme was simply due to the fact that it came at the time when the city was not ready for it.[15] The local city population were then just not interested in the natural landscape of the rainforest above which the cable-car was travelling, and there was only a small contingent of tropical rainforest lovers among the foreign tourists in the early 1970s. In those years, the tropical rainforest was thought to be swarming with malarial mosquitoes, poisonous snakes and other life-threatening inhabitants. By 1974, a mere two years after its opening, the project was totally abandoned inspite of the fine high ground views it allowed of Kuala Lumpur.

There were a few cultural reasons why the local population did not seem to appreciate the project. The first being that they were too used to the natural landscape surrounding Kuala Lumpur and their hometowns or villages. The failure of the chalets to attract local visitors from out-stations also lay in a deep-rooted prejudice among ordinary Malays against the stigma of immorality associated with guesthouses and hotels.[16] Because of this prejudice and strong family tradition, the Malays would normally stay with families and relatives during short visits to the capital city, even if this meant living in cramped squatter huts in any one of the numerous former mining lands or within the railway reserves. To such people travelling in a cable-car was a novelty, once experienced, the thrill faded. When the cable-car system lost its appeal, the hill-top restaurant was doomed. Failure of the project left the chalets, restaurant and cable-car system derelict within the forest. The local authority was quite content to leave nature to reclaim the areas that had been scarred.

The recent upsurge of interest in tropical rainforests as a result of the campaign for their conservation, has given impetus to one more attempt to develop the forest reserve into a tourist attraction, to be called Bukit Nenas Eco-Tourism Park (Fig. 6.5).[17] Because of its location, it is assumed that it will be ideal in attracting short-stay foreign tourists. The success of three recent events contributed heavily in the marketing of the proposed development. The first event was the Pacific-Asia Tourism Association (PATA) meeting which Malaysia hosted in 1989. The second event was the "Visit Malaysia Year" of 1990. One

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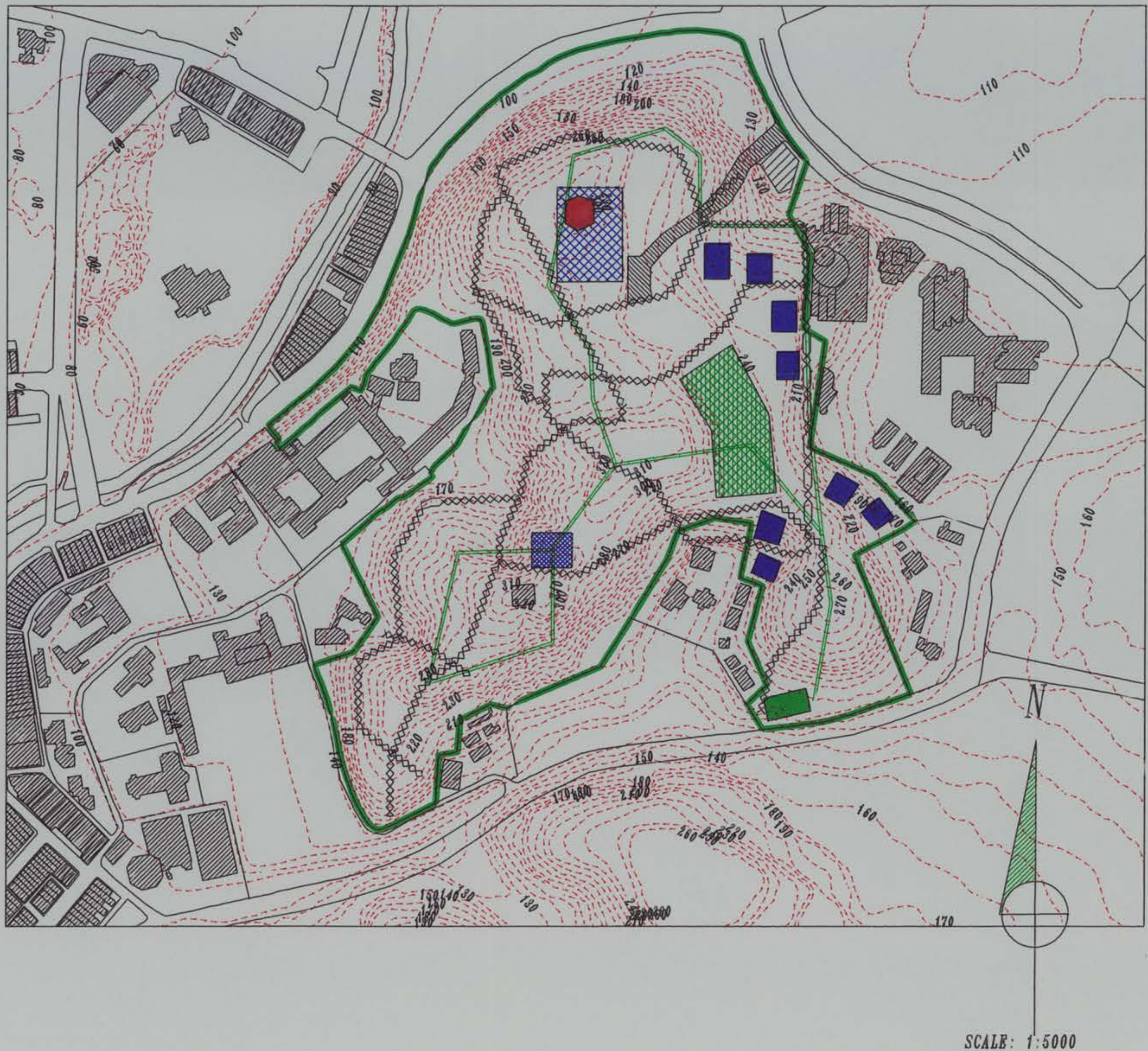
CASE STUDY 1: BUKIT NENAS FOREST RESERVE

PROPOSED BUKIT NENAS ECO-TOURISM PARK

FIGURE NO.: 6.5



Source: Dept. of Urban Planning, DBKL, 1991

File: ECOPARK.AML

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993 main tourist group targeted by the promotion exercises during these two events were the eco-tourists coming mainly for the natural beauty of the country.[18] The third event was the Kuala Lumpur International Conference on Environment in May, 1992.[19] The closing ceremony of the conference was conducted from within the forest reserve, on the top of the Nenas Hill, and internationally broadcast, giving the forest reserve a premier exposure in the international eco-tourism world. Incidently this last event also indicated the government's recognition of the special value of this urban landscape resource - its very existence in the middle of the capital city was stressed and used as a form of counter-propaganda material in the government's fight with international environmental groups who had accused the Malaysian government of blatant over-exploitation of the country's rainforest.

After a lapse of two decades, there are now significant signs that the attitude of the local population towards natural landscape has changed. Indications are that this attitude may be attributed to a few factors (Appendix 2).[20] The first factor is the improvement in education of the local population, making them more appreciative of nature. The second factor is related to the increase in the affluence of society. Both these factors build on the global trend of better awareness of the importance of nature in general and rainforest in particular.

Nostalgia may also be a very important factor in the increasing popularity of natural landscape in urban areas. As the majority of the Malay population of Kuala Lumpur are either first or second generation rural migrants, the attachment to rural areas and things associated with them is still very strong. Baba, S. (1992) noted that one of the factors that moulded the value system of the new generation of urban dwellers were the frequent visits to the grandparents' villages in the rural areas.[21] He concluded that the cultural link made the attachment to nature in the succeeding generation very strong indeed.[22] Very fast development of the country in general and areas around Kuala Lumpur in particular has resulted in natural landscape becoming more and more remote from the urban population. This in turn has increased the appreciation for pockets of natural landscape such as Bukit Nenas Forest Reserve.

In contrast to the earlier development, the development of the proposed eco-tourism park on the Bukit Nenas Forest Reserve, will actually be based on the rainforest of the hill as the main attraction. Three basic elements of the plan are proposed to achieve this objective: firstly an overall and panoramic view of the forest in contrast with its surrounding; secondly intimate experience of being within the forest during the day time; and lastly the experience of actually living within the rainforest at night.

The first stage in the plan is to declare the forest reserve a nature park. This will enable a change of management regime from perpetuating the status quo to actually having leisure activities within it. To achieve the overall and panoramic view of the rainforest, the plan has proposed the construction of a viewing tower. To a government bent on projecting the new image of Malaysia, unfortunately sometimes through extravagant projects, the tower which was initially planned to be the tallest in South-east Asia, has now been upgraded to be the tallest in Asia.[23] It would come complete with a revolving capsule that would house restaurants and viewing arcades. The tower would be connected to a base station with a cable car system, which would traverse the length and width of the park, as in the earlier project of 1970s.

A network of nature trails have been proposed to give visitors as much chance as possible to experience the rainforest intimately. These would not be constructed of concrete and metal as in the former project, but would be of natural materials such as stones and logs. The trails proposed would lead visitors to every ecological zone in the proposed park, such as secondary forest, shrubbed areas, and the real virgin area. Important plants such as commercial timber-producing trees would be labelled for the benefit of the visitors. Boards would be located at strategic points to explain to the visitors the background to the formation of that particular part of the forest. Benches would be located at various sites for rest and casual observation of the forest and outward viewing. For those who would be interested in watching the big fauna of the park such as Dusky Leaf Monkey (Presbytis obscura), Mousedeer (Tragulus kanchil) and Malayan Monitor Lizard (Varanus salvator), hides would be located in strategic locations for both day and night watching.

Opportunity to experience living within a tropical rainforest, especially at night would be met by a proposal to build chalets within the rainforest. These chalets would not be brightly painted like the previous ones, but would be built in traditional on-stilt structures of the Malay small houses style so that they would blend in very well with the forest.

Fig. 6.6 summarises the steps taken in the sketch GIS presentation and analysis of the proposal. The first step is to establish analysis objectives and criteria. This thesis study has maintained that the main objective of any development of the forest reserve should reinforce its sustainability, and strangely this is also the stated objective of the Kuala Lumpur Structure Plan, 1984, even though as has been seen in the above discussion, many things seem to have changed since then. Accordingly, the analysis criteria developed are any activities proposed that may adversely affect the forest ecosystem.

The second step in the analysis is the preparation of the data for spatial operations. To study the real impact of the proposal on the forest ecosystem, one has to have

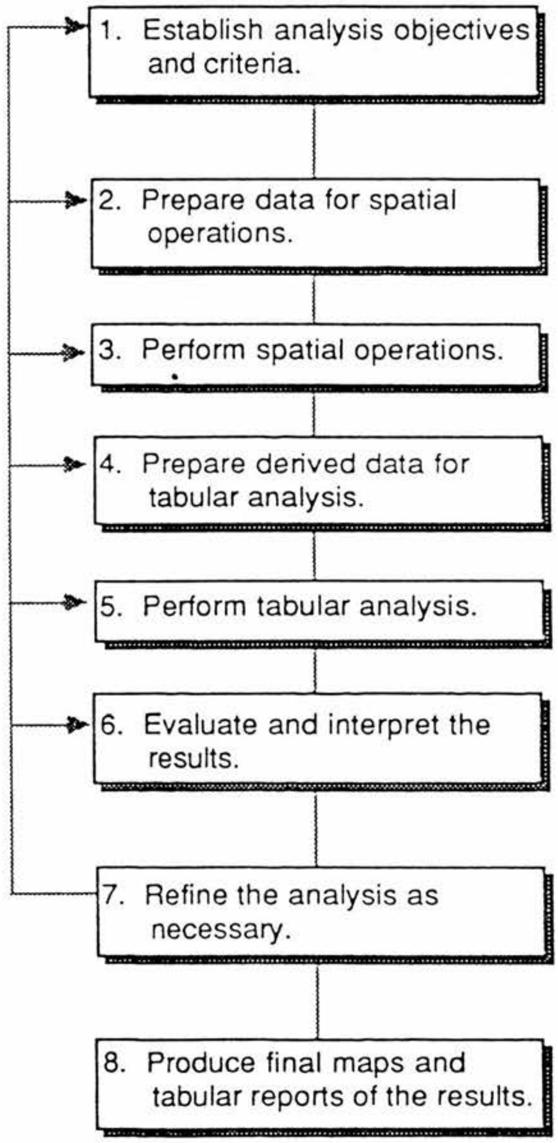


Fig. 6.6: GIS Impact Analysis of the Proposed Eco-Tourism Park.

detailed data, based on a thorough understanding of the working of the rainforest ecosystem. Fundamental researches in this field are scarce and of doubtful relevance, as they tend to focus on remote and rural settings (Harrison, J.L., 1962, Wells, D.R., 1971) or are specific to species not normally found in areas within or close to urban areas (MacKinnon, J.A., 1971).[24] A study of Bukit Timah Forest Reserve of Singapore by Murphy, D.H. (1973), only concentrated on the invertebrate animals.[25] This present sketch therefore, concentrates on identifying areas where man is likely to interfere with the elements of the rainforest, termed here as "impact polygons". Crude this may be, but it is intended to provide the foundation for a more detailed analysis of the impact. For example, if the lifestyle of the Mousedeer (Tragulus kanchil) is better known through forth coming research, then its territory within the forest reserve may more confidently be mapped by the GIS interrogating the database for locations of for example the plant species such as Simpoh Air (Dellinia sp.) and Senduduk (Melastoma malabathricum) that form its main dietary requirement together with, incidences of sighting, or favourite habitats such as water holes or salt licks. If this map is overlaid, this time using the GIS OVERLAY function, with a map that shows where man is likely to trample or build structures and buildings (impact polygons), then the derived map will show areas where these two incompatible mammal species (Homo sapiens and Tragulus kanchil) seem to have conflicts of territory. If through this simple spatial analysis, it is found that the area of relatively undisturbed habitat of the mousedeer is too small or too fragmented and disjointed for its survival in the forest reserve, then the analysis would have concluded that the proposal will severely affect the mousedeer of the forest. Similar analyses may be carried out for other indicator wildlife species, such as the Dusky Leaf Monkey

(Presbytis obscura) or the Squirrel (Lariscus insignis jalorensis).

A similar understanding of the plant species may also be important. If, for example, through trampling and building, man interferes with the processes of natural regeneration of plants, or causes the displacement of certain species by other more gregarious species such as the two apparently irrepressible Acacia (Acacia cicinata and A. auriculoformis), then there is an impact, and the forest may not survive as it is to support other forms of plant life such as epiphytes, climbers, stranglers, parasites and the myriad of small and tiny wildlife within it. The extend of this damage, for example, may be approximated from an observation by Burgess (1961) who made a study of timber extraction on Gunung Tebu, in Sabah, a typical lowland mixed dipterocarp rainforest not too dissimilar with Bukit Nenas Forest Reserve.[26] According to this study, only about 35 percent of the area would remain undamaged and that most of the damage done would be to the lower levels plant species and resident wildlife. The interdependence of species will have to be understood clearly, for example the lifestyle of small animals such as leaf frogs, insects and birds and their plant species. They may very well be adversely affected by the change in the micro-climate of the forest as a result of clearing and fragmentation of the wooded area. An inventory of plant species may also be connected with some of the external factors in the sustenance of the forest reserve, namely the nightly visits by the Fruit Bat (Chironax melanocephalus) or the Wild Pigeon (Treron sp.) or even the insects such as the bees which normally are quite selective of the trees they build their nests in. If, for example man's activities within the forest reserve result in drastic reduction of the Common Fig (Ficus sp.), then the Wild Pigeon (Treron sp.) may have to search elsewhere for their favourite food. The wasps of the Agaonidae family which breed by laying their eggs within the ovary of the gall flower of a fig may just disappear. Similarly the reduction of Petai (Parkia speciosa), Wild Durian (Durio malaccensis and D. griffithii), Chempedak (Artocarpus integer), Kandis (Garcinia sp.) and Rambutan (Nephelium lappaceum) may cause the Fruit Bat (Chironax melanocephalus) to search elsewhere for their food. If the forest emergents such as Meranti (Shorea curtisii) are felled, the wild bees may also look somewhere else to build their nests.[27] The opening of the cover to the full heat of the hot tropical sun may eliminate one of the most interesting ground level plants, including the pitcher plants (Nepenthes ampullaria) and the ground fungi and mosses. The loss of these species will have a chain effect on other wildlife and plants species in the rainforest forest ecosystem; and the forest will exorably degrade. Presently this kind of knowledge is not available, limiting the scope of data collection to little more than a forest inventory. Even this is presently not available so that study must rely on less than satisfactory sources such as aerial photographs, annual reports and sketchy ground reconnaissance.

Despite the above limitations, steps to carry out more detailed impact analysis will be outlined so that as the data becomes better in term of quantity and quality, as it will undoubtedly will, the real impact of the development will progressively be better understood. In fact one of the main objectives of this study is to ignite the interest in researches on ecosystems of relict forests, river corridors, and derelict lands so that they will increasingly become more accepted as resources.

Bearing all this in mind, the first practical step in the study was to express the available data's spatial distribution using the GIS clipping function. This was sketched in to help identify the areas involving the proposed development and their immediate surroundings. This clearly reduces the amount of data needed to be screened when studying the case study area. All the other relevant data coverages such as vegetation, soil, ecological zones and land use might then be CLIPped using the same set of co-ordinates in order to ease the overlay and other analysis processes.

In the absence of this full coverage, the next stage was to BUFFER, each element of the plan for the Bukit Nenas Eco-Tourism Park to a distance most likely to represent the extent of human physical interference within the forest. Two types of BUFFERing exercise were done. The first was was with line elements. This exercise was used to estimate the area most likely to be affected by the activities along the corridors of movement, for example, the nature trail network and the access roads. Distances were plotted, for example of 10 - 20 metres, from which a visitor might likely to wander from the designated trails. By INTERSECTing the polygons created by the BUFFERing exercise over the resource coverages, it was then possible to visualise and to calculate the approximate area affected by the proposed nature trails network at these distances (Fig. 6.7). This type of BUFFERing was also used to accertain the impact around polygon elements such as buildings (Fig. 6.8) and roads (Fig. 6.9). The first part of this analysis was BUFFERing for the possible clearing around the respective buildings. Table 6.2 summarised the general impact on the forest reserve that might be forecast from this preliminary analysis. Given a full database with information such as detailed floral and faunal species, soil and slope, it might also be possible to tabulate a more detailed breakdown of the resources affected and put under stress than were given by Table 6.2 and Table 6.3. This might be done by the SELECT function of INFO interrogating the Polygon Attribute Files (PAT) produced by the overlay operations for detailed count of each species within the affected areas shown in Figures 6.7 - 6.10.

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URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

IMPACT OF PROPOSED ECO-TOURISM PARK

(NATURE TRAIL)

FIGURE NO.: 6.7

LEGEND

- EMERGENTS (HIGH INCIDENCE)
- EMERGENTS (LOW INCIDENCE)
- MACARANGA SP. DOMINATED
- FICUS SP. DOMINATED
- PALMS (HIGH INCIDENCE)
- BAMBOO DOMINATED
- MELASTOMA & WOODY SHRUBS
- IMPERATA SP. DOMINATED
- MUSA SP. DOMINATED
- ORNAMENTAL PLANTING
- RESERVE BOUNDARY

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: NTIMPACT.AML

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URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

IMPACT OF PROPOSED ECO-TOURISM PARK

(BUILDINGS & CAMPSITE)

FIGURE NO.: 6.8

LEGEND

- EMERGENTS (HIGH INCIDENCE)
- EMERGENTS (LOW INCIDENCE)
- MACARANGA SP. DOMINATED
- FICUS SP. DOMINATED
- MELASTOMA & WOODY SHRUBS
- IMPERATA SP. DOMINATED
- ORNAMENTAL PLANTING
- RESERVE BOUNDARY

SCALE: 1:5000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: BTIMPACT.AML

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

IMPACT OF PROPOSED ECO-TOURISM PARK

(ROAD & PARKING)

FIGURE NO.: 6.9

LEGEND

- EMERGENTS (HIGH INCIDENCE)
- EMERGENTS (LOW INCIDENCE)
- PALMS (HIGH INCIDENCE)
- BAMBOO DOMINATED
- RESERVE BOUNDARY

N

SCALE: 1:5000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: RDIMPACT.AML

Resources Affected	Elements of the Proposed Eco-Tourism Park (Hectares)				
	Bldg	Road	Nature Trails	Area	%
Emergence (H.I.)	1.03	0.61	0.87	2.51	37.69
Emergence (L.I.)	0.52	-	0.83	1.35	20.27
Macaranga Dominated	0.47	-	0.26	0.73	10.96
Ficus Dominated	0.27	-	0.17	0.44	6.61
Imperata Dominated	0.15	-	0.08	0.23	3.45
Palm Dominated	-	-	0.12	0.12	1.80
Melastoma & Woody Shrubs	0.63	-	0.11	0.74	11.11
Musa Dominated	-	0.17	-	0.17	2.55
Bamboo Dominated	-	0.21	0.10	0.31	4.65
Ornamental Planting	0.03	-	0.03	0.06	0.01
Total (Hectares)	3.10	0.99	2.57	6.66	100.00

Table 6.2: Impact of Polygon Elements of the Proposed Eco-Tourism Park on Vegetation Resources of Bukit Nenas Forest Reserve

The second type of BUFFERing exercise carried out in a similar manner was point buffering. Here point elements, such as, cable-car pillars, hides or benches were BUFFERed to certain forecast distances (say 10-20m) around which visitors were likely to venture, resulting in circle polygons (Fig. 6.10). As in the earlier analysis, INTERSECTing these polygons in an OVERLAY exercise with resource coverages would show the resources directly affected by the proposal (Table 6.3). The result of the

Resources Affected	Area Affected by Point Elements of Proposed Eco-Tourism Park	
	Area (Hectares)	%
Emergence (H.I.)	1.08	61.36
Emergence (L.I.)	0.35	19.89
Macaranga Dominated	0.24	13.64
Ficus Dominated	0.09	5.11
Total (Hectares)	1.76	100.00

Table 6.3: Impact of Point Elements of the Proposed Eco-Tourism on Vegetation Resources of Bukit Nenas Forest Reserve

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URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

IMPACT OF PROPOSED ECO-TOURISM PARK

(POINT IMPACT)

FIGURE NO.: 6.10

LEGEND

- EMERGENTS (HIGH INCIDENCE)
- EMERGENTS (LOW INCIDENCE)
- MACARANGA SP. DOMINATED
- FICUS SP. DOMINATED
- RESERVE BOUNDARY

SCALE: 1:5000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: PTIMPACT.AML

analyses above might also be tabulated by SELECTing the relevant Polygon Attribute (PAT) file, namely ECOPBUF.PAT, from INFO. Even though these polygons might not be physically visible on the ground, they would indicate areas which needed special management attention so as to reduce the impact on the forest. It might be prudent, for example to resite the locations of or to periodically close these point elements after certain periods to ensure the areas concerned were given the necessary respite.

An analysis to study the suitable locations of such points might also be carried out. The Eco-Tourism Park plan (Fig. 6.5) used only one criteria, namely view-point suitability, to assess the suitability of a point. In a nature-based park, while an exhilarating view or scenery is definitely a bonus, it may not be a top priority for people visiting it. This is because a panoramic view of Kuala Lumpur may usually be savoured in comfort through the windows of an air-conditioned hotel. Other criteria, such as the possibility of watching butterflies dancing in the sun, or a band of Dusky Leaf Monkeys, or the sound of a wood-pecker working its way into the dead tree trunks looking for grubs and worms, are probably more appropriate. To find sites that are suitable according to these criteria, one would have to have a much better database than is currently available. In order to do this, the database should have detailed locations of for example, salt licks for small mammals like the mousedeer, the types of trees that are the favourite of leaf eating monkeys, mud-pools that are slightly exposed to the sun for butterflies, fig dominated areas that may attract wild pigeons, and dead but still standing trees that are the favourites of wood-peckers. A GIS retrieval function might then easily identify locations of possible observation points located to safeguard the integrity of the forest.

An analysis of the suitability of the proposal purely on the siting of view-points may also be carried out using the INTERVISIBILITY function of the Irregular Triangular Network (TIN) programme. It would be possible to check whether from a particular view-point a good prospect could be achieved or if a certain part of the topography was blocking the view. In the proposal for the Eco-Tourism Park, all the views from the designated view-points are blocked by the proposed highrise commercial blocks on its eastern perimeter (Fig. 6.3). However, views could still be afforded toward the west, including the river and its green corridor. The view from the summit of the hill to the north-east is already obscured by the existing blocks of hotels and offices.

The proposal did not make any mention of the use or incorporation of any historical or existing features within the forest reserve such as the site of the Malay fortress on the knoll just above the schools. Howevere, the function of the international telecommunication tower is transfered from the existing pillion-looking structure to the proposed tower as the construction of the tower is now entrusted to Talikom Malaysia. It is also assumed that the City Hall's waterfall, if it cannot be demolished, will be incorporated within the project, even though it will remain as an unconnected "landscaped" patch surrounded by nature. The horror of all this may be imagined even without GIS looking any further.

Development of Alternative Proposals for the Development of Bukit Nenas Forest Reserve

Given an adequate data base, GIS functions may also be used to evaluate alternatives to the preceding proposal to exploit the resources that are available. Several alternatives might be considered for the management of the hill. The first might be the combined proposal of Bukit Nenas Eco-Tourism Park and its adjuncts. For convenience sake, this will be called Alternative (1) (Fig. 6.11)

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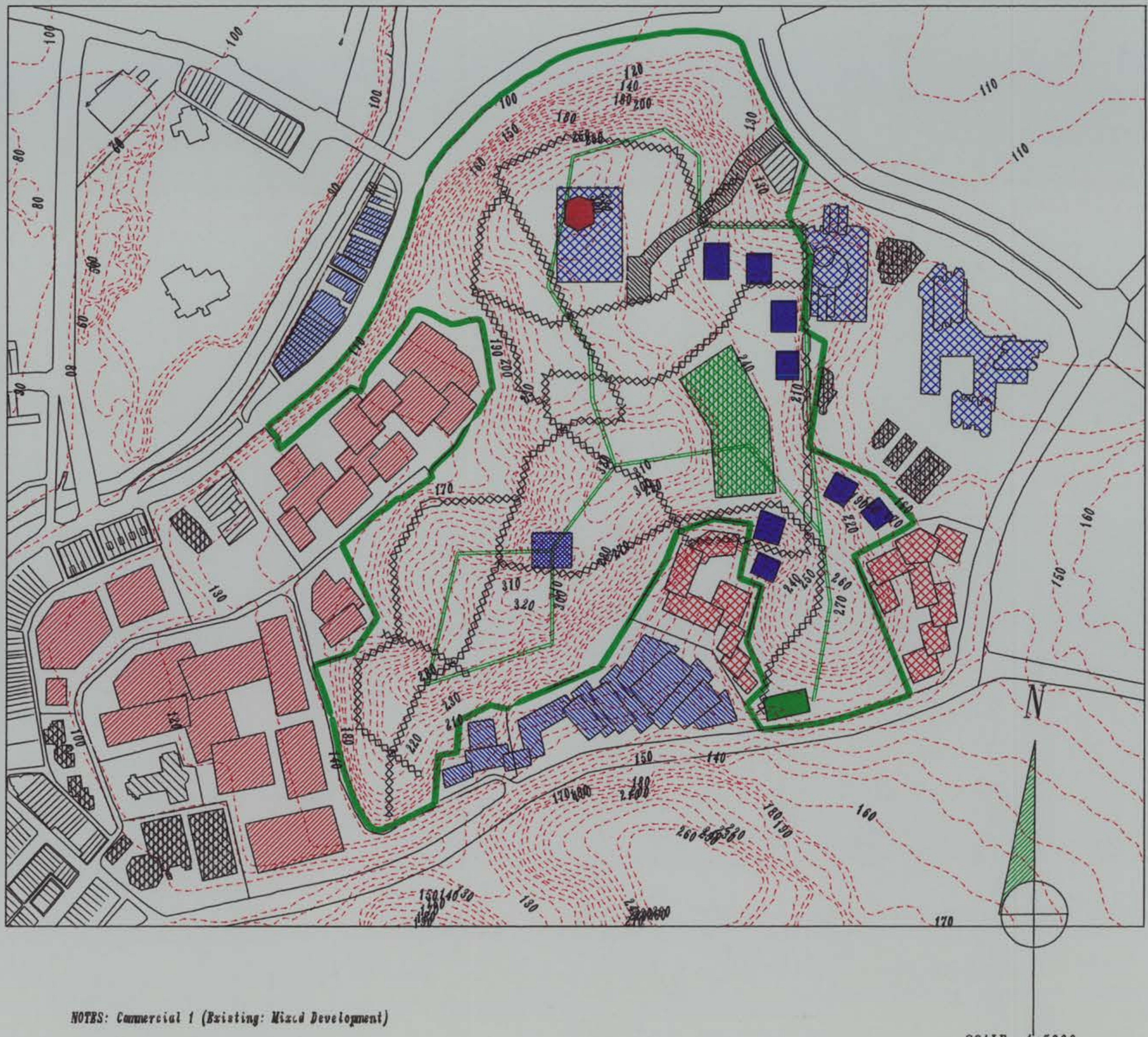
URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

PROPOSED DEVELOPMENT ALTERNATIVE 1



SCALE: 1:5000

FIGURE NO.: 6.11

LEGEND

PROPOSED:

- CAMPING GROUND
- BASE FACILITIES
- VISITOR CENTRE
- SELF-CATERING CHALET
- UPHILL FACILITIES
- VIEWING TOWER
- ROAD
- CAR PARK
- NATURE TRAIL
- CABLE CAR ROUTE
- RESERVE BOUNDARY
- COMMERCIAL 1
- COMMERCIAL 2
- CONDOMINIUM

EXISTING

- HOTEL
- OFFICE
- COMMERCIAL
- PARKING
- CHURCH

NOTES: Commercial 1 (Existing: Mixed Development)

Commercial 2 (Existing: Schools)

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: ALT1.AM.

The second alternative (Alternative 2) might examine the reversion of all the area of the hill with the least constraints into the existing forested area (Fig. 6.12). The premise of this alternative would be that if the future of the forest reserve was to be secured then the development pressure on lands adjacent to it might be negated by allowing them to revert to the public domain. Visually a small hill completely covered or dominated by green forest obviously makes better sense than one scarred and obscured from general view by patches of unrelated development. This alternative, if adopted would involve the government having to make a compulsory purchase of all the lots of lands privately owned and currently occupied by the dilapidated bungalows and shophouses on the eastern slopes of the hill. Compulsory purchase might be made using the power of the Land Acquisition Act, 1953. This act allows compulsory acquisition if a piece of private land is needed for the provision of a public amenity or facility. In the process, the government would also need to rescind the various planning approvals for the development of these lots of lands. This would convert and add some 5.60 hectares of green area to the forest reserve, increasing its area by about 50 percent. Longer term management would then be concerned with control of access and management of the different levels of the forest so that the full cycle of natural revegatation will eventually take place.

Alternative (2) as stated might not envisage any restoration of the dilapidated buildings and structures on the lands concerned, except a few on the fringe that may be used as living quarters for the park wardens and their families. Management would perhaps adopt an active policy of letting the existing buildings and structure rot and be eventually taken over by the vegetation. An obvious advantage of such a policy would be the minimal funding needed for restoration and subsequent maintainance work on these buildings and maximum area left to revert to nature.

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URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

PROPOSED DEVELOPMENT ALTERNATIVE 2

FIGURE 6.12

LEGEND

- EXISTING FOREST RESERVE
- NEW AREAS (ACQUIRED)
- NATURE TRAIL NETWORK

N

SCALE: 1:5000

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File: ALT2.AML

The process would present an interesting prospect for a long term study on the rate and elements of regrowth, either as serious study to be undertaken by professional foresters and ecologists or as nature study for nearby schools.

A third alternative (Alternative 3) might be based on the idea of the eco-tourism park concept, but without the observation tower and the chalets (Fig. 6.13). This concept might also exploit the existing resources within the hill complex. It would require the management of natural revegetation within the adjacent privately owned lots, and which should first be taken over through compulsory purchase by the government as in Alternative (2).

Currently the privately-owned lands are almost overgrown with secondary growth of Purang (Macaranga triloba, M.griffitheana), Pulai (Alstonia augustifolia), the two common varieties of Acacia (Acacia auriculoformis, and A. cicinata) and False Cherry as they are left untended by the owners who are probably involved in speculative land dealings. Undergrowth is mostly covered in the irrepressible hardy grass, Lalang (Imperata cylindrica) and the woody shrubs of Senduduk (Melastoma malabathricum). In some areas Semalu (Mimosa pudica) covers the ground. Because the bungalows were formerly occupied, many matured and ancient-looking exotic species such as Rain trees (Entrolobium saman), Angsana (Pterocarpus indicus), Indian Rubber (Ficus elastica), Jemerlang (Petrolorum pterocarpum) and Blue Juniper (Juniperus sp.) are found. Typical domestic fruit trees such as Pamelo (Citrus sp.), Jambu (Eugenia aqua), Langsat (Langsium sp.), Bacang (Mangifera sp.), Kedondong (Burseraceae sp.), Mangosteen (Garcinia sp.), Rambutan (Nepthelium sp.) and Durian (Durio sp.) are found on the sites. The existence of the domesticated fruit trees and the berries-producing wild vegetation above, makes the area attractive for many form of wildlife such as birds and bats. A few specimen of ancient looking Rubber

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URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

PROPOSED DEVELOPMENT ALTERNATIVE 3

N

SCALE: 1:5000

FIGURE NO.: 6.13

LEGEND

- EXISTING FOREST RESERVE
- NEW AREAS (ACQUIRED)
- BUNGALOW
- PARK CENTRE
- FOLK MUSEUM
- NATURE TRAIL NETWORK
- CABLE CAR NETWORK

Compiled by Ismawi H. Zen on ARC/INFO, October, 1993

File: ALT3.AML

tree (Hevea braziliensis) are found around the bungalows. Some very old coconut palms (Cocos nucifera) are found in the compounds of some of the bungalows. Some very old flowering domestic plants such as False Oleander (Nerium oleander), Bunga Kertas (Bougainvillia sp.), Bunga Pecah Piring (Ixora javanica), Nafiri (Jasminum sp.) and Golden Trumpet (Allamanda cathartica) are also found in the area. The presence of these plants amidst natural vegetation present a very interesting mixture and similar to that found in old communal fruit groves in the rural areas before the advent of commercialism. In this and the latter alternative, the vegetation probably would be selectively thinned and then allowed to grow naturally with minimal human intervention.

The second part of Alternative (3) might involve the possible adaptation and reuse of the dilapidated bungalows as self-catering holiday cottages for short-term tourists, and the restoration of the dilapidated shophouses into an eco-tourism centre for the area. One of the bungalows, namely the former headquarters of the Aboriginal Welfare Department, Selangor, may be rated as an historical building and has distinct possibilities for conversion into some form of aboriginal folk museum. This would certainly be in keeping with the overall proposal because most of the remaining aborigines still live nomadically and semi-nomadically in the thick rainforest of the peninsula. A proposal to restore the dilapidated bungalows would also provide unique holiday residences of a kind very popular during the pioneering years. This might be thought by tourists more comfortable than rural type houses among the tourists. Romantic images of adventures and spartan lifestyles connected with bungalows popularised by famous authors such Bird, I (1883), Sommerset Maugham (1951), Gilmour, A. (1974), Allen, C. (1983), and others would be enough publicity for these colonial bungalows.

A fourth alternative (Alternative 4) might be basically an extension of Alternative (3) together with one of the basic proposals of the Kuala Lumpur Structure Plan, 1984, namely the relocation of the schools (Fig. 6.14). This would involve testing the taking over of the buildings of the schools and turning them into say youth hostels, keeping the playing fields and nurturing natural revegetation of the parts not used as playing fields. Other than catering for young foreign tourists, the hostels might be turned into a centre for youth training in relation to the management of forest and nature-based tourism and perhaps also outward-bound type school for urban youths. This last option would definitely benefit from the extensive existing infrastructure and facilities available in the schools. The potential demand for such training in Malaysia is great if the present global trend of nature-based and eco-tourism continues.

Rather less plausibly and certainly less sustainably, the underground carpark being constructed under the St. John's Institution's playing field might be kept as the central carpark for the eco-tourism park option thus eliminating the need to disturb other areas for this potentially high impact but necessary facility. This alternative would also involve the relocation of the schools into new premises on the outskirt of the city as envisaged by the Kuala Lumpur Structure Plan, 1984. Initial problems may be anticipated here but if the church is kept, and the replacement schools are provided with better facilities, including a long term special arrangement for continued periodic use of certain facilities within the park by the schools, experience has shown that the anticipated opposition to such a move may soon be placated. An example of this conservation approach has been recommended in Singapore involving also a convent and a missionary school (Repellin, 1991).[28] This move may not

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URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

LOCATION OF BUKIT NENAS FOREST RESERVE

CASE STUDY 1: BUKIT NENAS FOREST RESERVE

PROPOSED DEVELOPMENT ALTERNATIVE 4

FIGURE NO.: 6.14

LEGEND

- EXISTING FOREST RESERVE
- NEW AREAS (ACQUIRED)
- YOUTH CENTRE
- BUNGALOW
- PARK CENTRE
- FOLK MUSEUM
- YOUTH CENTRE & HOSTEL
- NATURE TRAIL NETWORK
- CABLE CAR NETWORK

N

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File: ALT4.AML

only solve the problem of daily traffic congestion but also the need to conserve the school buildings.

Evaluation of Alternative Proposals for the Management of Bukit Nenas Forest Reserve

Given an adequate database GIS might then be employed to thoroughly test the four options outlined above. But even without such data the following sketch will, it is hoped, indicate how GIS might be usefully applied, using only some of the very imperfect pieces of site information available to the author.

An evaluation of the four alternatives for example be made using a simple Cost and Benefit Analysis and Goal Achievement Matrix based on a number of assumptions. From there a sketch criteria might be drawn up to test the four options against. The first criteria might be the achievement of the objectives of the Kuala Lumpur Structure Plan, 1984 either directly related to the forest reserve or to Kuala Lumpur generally. The second criteria might be the financial benefit and cost expressed probably in a very simplified but helpful form. The last criteria might then be the environmental benefit and cost (Appendix 9).

The first criteria might be further sub-divided into several main items: firstly a need to keep Bukit Nenas as a natural green open space; secondly a need to increase the amount of designated open space in Kuala Lumpur; thirdly a need to preserve the natural heritage of Kuala Lumpur; lastly to provide an enhanced sense of physical form to the city with the green Bukit Nenas continuing the central skyline. These criteria might then be tested using for example the viewshade analysis previously mentioned and expressed by GIS. On all the sub-criteria described above, Alternative (1) would probably score poorly except in the second. The best performer on this criteria would probably be Alternative (4) but acceptance of this or Alternative (3) would need extensive justification based on further analysis and well beyond the scope of this study and its data.

The second criteria might also be further broken into a set of sub-criteria: firstly for example, the cost of land acquisition; secondly the cost of construction; thirdly maintainance and running cost; and lastly financial benefit.

With the land value in the area reaching as high as M$200.00 per sq. feet in 1976 and probably double that amount now, the cost of land acquisition is very high indeed (DBKL, 1982).[29] However, because the government valuation system discounts speculative factors, the price normally can be brought down to a figure slightly less than half the amount above, which brings it to about M$200.00 per sq. ft. The amount needed on this basis to acquire land according to each alternative may be estimated as given in Appendix 9.[30] The government might rescind the earlier planning approvals because of the lapse in the period of development orders and that the planning applications might have been made as part of a land speculation which would automatically nullify the approval. The best performer on the first sub-criteria would be Alternative (1) as it might not involve any compulsory purchase of private land. The lowest performer would Alternative (4) as it might involve the compulsory purchase of all adjacent lands and the possible provision of replacement schools.

The estimated cost of constructing the telecommunication cum viewing tower on the top of Nenas Hill would be approximately M$125 millions (Talikom Malaysia).[31] However a very modest figure of only about M$50,000 per unit would be needed for an extensive restoration work on the bungalows.[32] A figure of M$30,000 per unit would be needed for the restoration of the colonial shophouses.[33] However, there as there was no cost figure available for the work on adapting the school buildings for youth hostels, an educated guess of M$250,000 would probably be adequate based on the fact the schools are relatively well maintained and that it would basically be an internal work. Based on these crude figures, the highest performer on the second sub-criteria would be the Alternative (2) with the worst performer being Alternative (1) but such an outline would be excessively naive without any assessment made of the income return on investment.

Alternative (2) would involve little construction, except nature trails and perhaps, the building of perimeter fencing to stop squatting and rubbish dumping activities, Alternative (1) would involve a heavy investment in the construction of the tower and other facilities.[34] Other alternatives would not need perimeter fencing as active maintainance regimes required will in themselves deter the above illegal activities. Alternative (3) would probably involve a substantial amount for restoration work to the bungalows, while for Alternative (4) an added amount for compulsory purchase of, restoration and adaptation work on the schools as well as their replacements might be needed. If the database have been fed with the necessary information above, its INFO programme might be accessed to provide the estimated cost, and probably benefit, after the ARCPLOT was programmed to draw the physical plan of each option.

On the third sub-criteria (maintainance cost), the same order of score allocation would have been achieved. This was because while Alternative (2) would involve almost negligible maintainance cost, Alternative (1) definitely would involve a huge expenditure, but again, without a far more detailed analysis based on adequate data the full effects of maintenance of the rainforest habitat for four options could not be properly assessed or costed into this crude first assessment. With adequate database, INFO would be able to present these figure together with the above (construction cost) and would have presented the researcher with the appropriate total for each option.

The third criteria (environmental management) may also be sub-divided: firstly, for example, the resources that would be lost during as a result of the initial environmental disruption during the construction period; secondly the resources that would be lost permanently as a result of the proposed development; thirdly environmental benefit that might be accrued from keeping the status quo; fourthly environmental benefit that may be gained in term of increased resources as a result of implementing a particular option; and lastly the possibility of conserving the historical heritage but again without far more detailed analysis based on adequate data and beyond the scope of this thesis, we cannot take this further.

Alternative (1) for example might be assumed to perform the worst on all the sub-criteria as its construction would involve a large area of forest to be felled, a huge amount of earthwork and untold disturbance to the wildlife because of the construction activities. The area directly affected by these activities could be seen in Fig 6.9-6.11. By comparing new levels (spot heights or contour lines) and existing heights with the TIN programme, the amount of earthwork may be calculated if the base heights are supplied. The extent of direct disturbance to the wildlife may be shown by buffering the area where the noise level would be too high for them and given of course adequate data on this highly specialised subject. Presently the data required for both these exercises is not available, but assumptions might be made for the present discussion purposes.

Alternative (2) for example might be assumed to perform the best on the first two sub-criteria as it does not appear to require any form of environmental disruption or loss of resources even though in the long term it will mean the loss of the cultural resources (16 bungalows and 4 shophouses). On the other hand, Alternative (4) however utopian, appears to be the best overall performer in terms of increased environmental resources and the conservation of all historical heritage that exist on the site. Assuming that all detailed analysis ommitted here supported these conclusions we might then summarise the preceding criteria evaluation something like Table 6.4 on page 272:

EVALUATION CRITERIA	ALTERNATIVES			
	Alt.1	Alt.2	Alt.3	Alt.4
1. Achievement of the objectives of KL Structure Plan, 1984				
i. Conserve Bkt. Nenas as natural green area	1	3	2	2
ii. Increase KL's functional open space	2	1	2	3
iii. Conserve KL's natural heritage	1	3	2	2
iv. Provide sense of physical form to KL	1	2	2	3
2. Financial Benefit Against Cost				
i. Land Acquisition	3	2	2	1
ii. Construction Cost	1	3	2	2
iii. Maintainance Cost	1	3	2	2
iv. Benefit	2	1	2	3
3. Environmental Benefit against Cost				
i. Initial environmental disruption	1	3	2	2
ii. Permenant Loss of Resources	1	3	2	2
iii. Status quo	1	2	2	3
iv. Increase of landscape or environmental resources	1	2	2	3
v. Conservation of Historical Heritage	1	2	2	3
Total Score	17	30	26	31

Note: Scoring is between 1-3 points, with the worst performer on each sub-criteria given 1 point and the best 3 points.

Table 6.4: Evaluation of Alternative Proposals for the Management of Bukit Nenas Forest Reserve

Conclusions from Case Study 1

A few important conclusions may be made from the first case study. The first one is the lack of consistency in the implementation of the policy on the conservation of important natural landscape resources such as Bukit Nenas Forest Reserve. A planning tool with a structured database and analysis function such as GIS would have been very useful in enhancing the planners' ability to project the full extent of the impact of certain elements of a proposed management regime and particularly those elements relating to the forest ecosystem.

The second conclusion is the persistence of a piece-meal approach in urban planning may lead to the degradation of an important resource because planning then becomes ineffective. Given better quality data, an integrative approach afforded by an information system such as the Geographic Information Systems (GIS) given adequate data might well help to bring together the overall scenario and test something like the true impact of a development proposal on one site against others.

In addition to the necessary data, the need for clear and objective criteria for evaluation of a project at local level is paramount in the selection of the optimum alternative to achieve the objective of a strategic plan. Given these, then GIS may well enhance the testing of such strategic objectives by translating them into functional models, but again, this is very much provided there is a systematically built and adequately comprehensive database. Neither of these were possible within the terms of the present study.

CASE STUDY 2: HISTORIC KELANG - GOMBAK RIVERS CORRIDOR

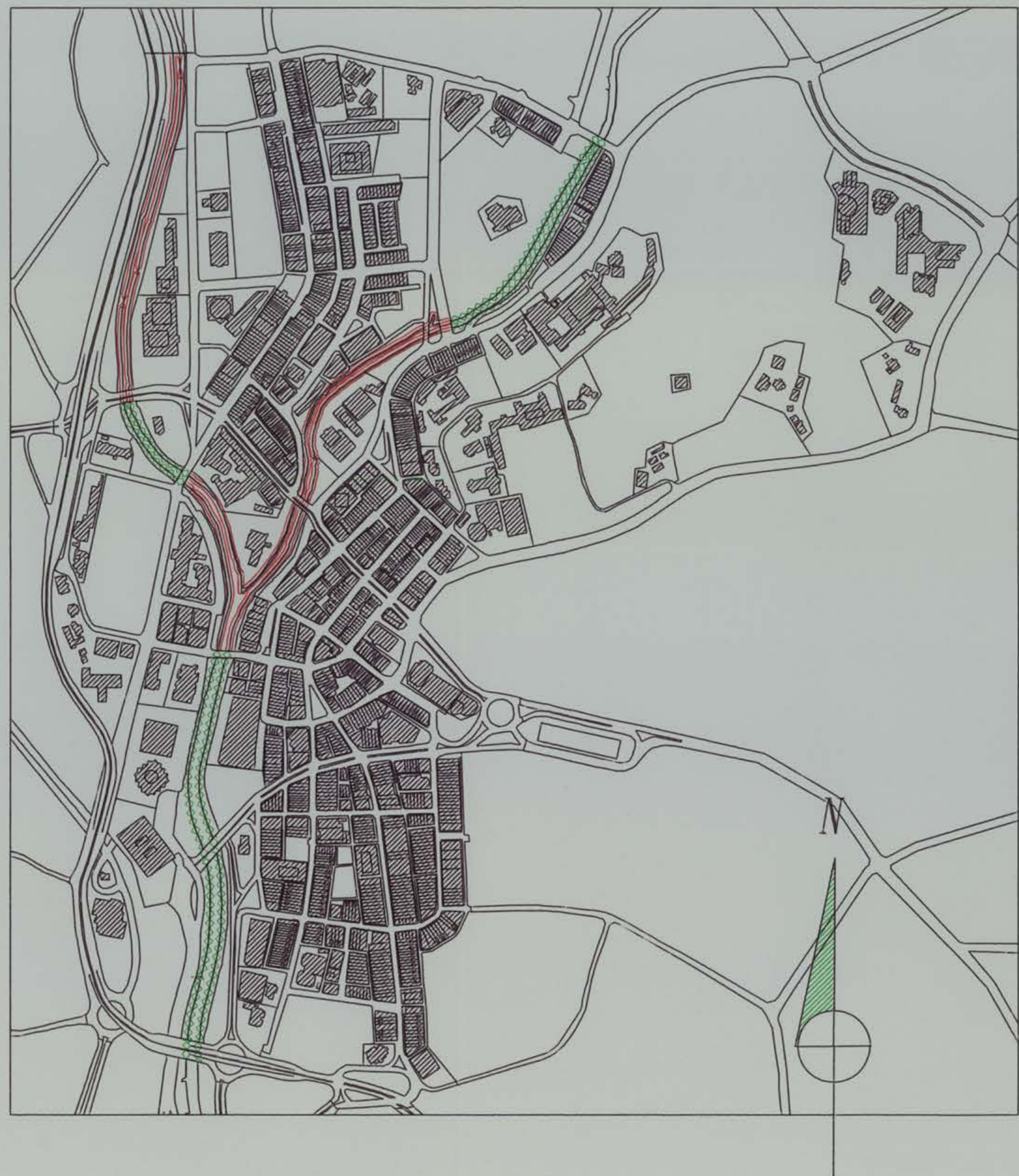
The second urban landscape resource selected as a case study is the Kelang - Gombak Rivers Corridor. After Bukit Nenas Forest Reserve, this is potentially one of the most important open space and landscape resources of Kuala

Lumpur, physically and culturally (Chapter 2). Unlike the first case study, the aim of this section is less to test the options for development of this corridor but rather to illustrate the ability of GIS technology in monitoring encroachment into it and providing a necessary early warning system to the planners. It offers an example of the descriptive power of GIS but again with its very limited data base, the present study can do little more than indicate its scope in analysis.

In many areas the corridor is still about one chain (about 20m) wide on both sides of the river. However there are stretches where this is no more the case. There are a few major developments and proposals that affect this corridor directly. The first is the Kuala Lumpur Flood Mitigation Project. The second is the Riverine Gardens and Parks Project and lastly the Kuala Lumpur Light Rapid Transit System (LRT). Beside these major projects, the cumulative impact of individual riverside developments also poses a major threat to the corridor. In this section, the impact of each of these projects will be analysed using the functions of ARC/INFO.

Kuala Lumpur Flood Mitigation Project

The Kuala Lumpur Flood Mitigation Project, based on the advice from Sinclair Knight and Partners Ltd. of Australia in 1978 is now being implemented in phases. Some of the sections within Kuala Lumpur Old Town have been concreted, while the others are now being straightened (Fig. 6.15). As will be seen this is certainly a solution to the flood problem that has been both overtaken by events, fashion and planning technology. It is an extremely simplistic solution to a very complicated problem. The project failed to interrelate the rate of development within the catchment area with the capacity of the river to carry the resulting surface run-off. This emphasizes the need for a better database and a better means of projection in urban planning



KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

FEDERAL TERRITORY OF KUALA LUMPUR
LOCATION OF THE STUDY AREA

CASE STUDY 2: KELANG-GOMBAK RIVER CORRIDOR

RIVER BANKS CONDITION

FIGURE NO.: 6.15

LEGEND

CONCRETED BANK

NATURAL / GRADED BANK

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

Source: Kelang River Unit, DID and Field Survey, May, 1991
File: RIVERBANK.AML

activity of this nature. This solution opted for an out-dated approach of very rapid draining of excess water solution without careful consideration of the benefit that may be derived from a delayed flow option, both economically and environmentally. As a consequence, it is apparent that this solution has totally failed not only to achieve its primary objective, which is mitigating the flood problem of the Kelang - Gombak Rivers, but it has also failed to exploit the various opportunities given by the tin mining history of the city (Zen, 1982).[35]

The first impact of this project is the sudden increase in the speed of the water flow. There is now a definite increase in the incidences of flash floods in Kuala Lumpur, including Kuala Lumpur Old Town (DoE, 1993). One of the worst in recent years was experienced in June, 1993 when a flash flood caused a massive traffic jam and the evacuation of thousands of residents (Appendix 6). The water level in the Kelang River rose to a level of six metres, the highest in the last 15 years. There are a number probable reasons for these incidences. The first is that the surface run-off is much higher than that anticipated by the Sinclair Knight study because of a higher than projected rate of development taking place generally in Kuala Lumpur and particularly within the watershed of the Kelang River system.[36] Because the Kelang-Gombak Rivers are the only means of draining excess water to the sea and there is no flood water retention scheme in operation yet, they are totally over-whelmed by the flow when it rains. The second reason is the blockages caused by siltation and rubbish dumping as the result of development and riverine squatting activities. A third reason is the implementation phasing which is quite haphazard and generally without regard to the upper stretch and as a result makes the lower part often unable to cope with the sudden rush of flow. Most of the lower stretches were straightened only when important developments took place in the vicinity, such as the construction of the new City Hall, the Resource Centre, the Holiday Inn-in-the City Centre, the Putra World Trade Centre, the Bank Bumiputra, and the Daya Bumi Complex, to name a few. This was done in order to transfer the cost and responsibility of work and initial maintenance to the project concerned, and saving the limited government funds for sections where less development was anticipated - the overall effect has proven to be quite disastrous.

In straightening the water course and strengthening the banks, the natural vegetation of the river-edge is almost totally obliterated. Whatever vegetation that exists along the river now is either natural regrowth or planted by the authority (Fig. 6.16).

In this study, a GIS would have been able to help in the projection of excess water flow into the river channel. To do this the database would need to have information pertaining to the growth of urban activities within the water catchment area of the river. Currently the Kelang Valley Planning Coordination Agency (KVPCA) is working on this particular GIS database. When this is done and information can then be off-loaded into this study's database, then an accurate calculation may be made about the surface run-off, based on the coefficient of the various types of land uses and their hectarage. A comparison with the carrying capacity of the river will surely reveal the shortfall in the capacity, making it necessary to work out some form of delayed flow. If the detailed information on the carrying capacity of each section is supplied by the Drainage and Irrigation Department, Malaysia (Kelang River Unit), then a more detailed analysis may be carried out in conjunction with the data on land use along the river. GIS will be able to project areas such as former mining lands, natural depressions, and wetlands that may serve as retention

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

FEDERAL TERRITORY OF KUALA LUMPUR
LOCATION OF THE STUDY AREA

CASE STUDY 2: KELANG-GOMBAK RIVERS CORRIDOR

VEGETATION OF THE RIVER CORRIDOR

N

FIGURE NO: 6.16

LEGEND

- NATIVE TREES
- EXOTIC TREES
- HARDY SHRUBS
- HARDY GRASS
- SOFT NATIVE GRASS
- REGULARLY MAINTAINED GRASS
- REED BED
- ORNAMENTAL PLANTING
- FORMER MINING LAND

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: VGRIVER.AML

Source: Field Survey, May, 1991

lakes. In this way, the necessity for a full river-length concrete wall becomes redundant.

If the KVPCA database is expanded to include the habitat information along the river, then, further refinement of the above solution may be generated with the use of GIS. A full length riverine park may be developed with a series of flood water retention lakes and aquatic and river edge habitats. If this has been done, riverine wildlife such River Otter (Cynogala bennetti), Malayan Civet (Paradoxurus hermphoditus), Kingfisher (Halcyon concreta), Pipit (Anthus sp.) and Wak-wak (Actophilornis sp.) would have continue to provide interest and ecological diversity to the river corridor.

Riverine Gardens and Parks

The banks and bank edges of rivers are among the richest and most diverse of all natural habitats. The Kuala Lumpur Structure Plan, 1984 has very little to say about this important resource. In one obscure policy (Policy No. LC7) which the river has to share with former tin mining lands, the structure plan said: "The authority (The City Hall of Kuala Lumpur) shall ensure the landscaping of river reserves....." (DBKL, 1984). In a four-line commentary that followed the policy statement, it is made clear that this policy is aimed at solving the acute shortage of open spaces in the city rather than a recognition of its cultural and historical importance.[37] This implies that the river corridor will be managed from a purely utilitarian point of view.

Seven years after the structure plan was adopted, the City Hall of Kuala Lumpur finally announced that it was planning to turn the river corridor into a series of riverine parks and gardens by the year 2001 (Yunos, 1991).[38] The implementation of the project which was due to start in 1992 was delayed due to a lack of funds. In any case, this project would be a cosmetic treatment to the engineering project. The riverine park was meant merely to ameliorate the works on the river deepening and the banks strengthening with concrete walls being carried out.[39] It aimed to turn the river corridor variously into gardens and wildlife parks. Accordingly, areas nearer the city centre were to be turned into scenic parks complete with pedestrian walks, rest and recreation areas. Those further away would be turned into wildlife parks although how wild and how lively was not explained. As the principal supervisors for the project would be civil engineers rather than landscape architects it will be suprising if the stated aims are achieved at all.

In the first instance, the opportunity for improving the damaged habitat in any real way would be destroyed by the concrete, and the opportunity for any other useful planting would be strictly contrained by the engineering requirements. The immediate water-edge planting will, in most probability, be Cow Grass (Axonopus compressus) to minimise maintainance. Any other plants will have to be a good distance from the water-edge and have a nominal ornamental value only.

With a GIS approach, this proposal for a riverine park might very well have been a prime mover in planning rather than an afterthought as it is now. With a structured database that stored all information pertaining to its historical association such as important historical points, and sites, for example the Pioneers' Landing Points, the historical bridges, and former government jetties, the plan for the park might have been designed around them. A database could have been fed with information on the locations of important ancient exotic trees planted during the founding years of the city, and the remnant habitats and native species. This information would certainly have helped in developing both the structure and details of the park design, rather than depending on a pathetic token gesture of new planting. The possibility of creating a habitat of ecological value would have stood a much better chance of realisation if the database had included information pertaining to the existing wildlife and their habitats along the river corridor.

The park in any useful form will not be a reality if the problem of its water pollution remains. Merely as a start this needs information pertaining to existing legal or illegal dumping locations, squatter settlements, points of discharge into the river, and land use and activities that may affect the river. With a comprehensive GIS database at the city or the catchment level as is now being developed by KVPCA, both short a term and a long term programme may be developed to stop all possible sources of river pollution. As in the experience of the British Waterways, a detailed inventory of all cultural artifacts and historical buildings along the water course, will greatly assist the planning process. Experiences of the Lee Valley Regional Park in London and the reclamation of Singapore River by the Urban Renewal Authority of Singapore (URA) might provide very useful examples in the development of such a park plan that might incorporate both the need for eventual pollution control and flood mitigation, but only after a very thorough study of the problems and their origins. Even though none of these three examples actually used GIS in their earlier work, the systematic data inventory and development monitoring required of them, could have been useful met by it.

Kuala Lumpur Light Rapid Transit System (LRT)

One of the most controversial proposals affecting the Kelang - Gombak Rivers Corridor, from the urban landscape resources point of view, is a proposal submitted in 1985 by a Japanese consultant firm, Kenzo Tange Associates in association with a local consultant firm, Arkitek Jururancang Malaysia to transform the river corridor into a Light Rapid Transit System (LRT) route.[40] Although this proposal has not been approved by the City Hall of Kuala Lumpur, it is a follow-up from the general public transportation proposal of the Kuala Lumpur Structure Plan, 1984. As the study was commissioned by the local authority itself, the likelihood of it being implemented, though with modification, is very high indeed. It would appear to be exceedingly difficult to reconcile the conflict between this proposal and the riverine park proposal above.

The first point of conflict will be the need for a clear pathway for the Light Rapid Transit System (LRT). This will not give much room for imaginative planting, much less the conservation of existing vegetation. In most cases the corridor is already too narrow for any reasonable planting scheme to be carried out; accommodating the train path at the same time may perhaps be asking a little too much. Secondly with the train passing through every quarter of an hour or so, it would be hard to imagine a more disruptive environment for relaxation and recreation, least of all for wildlife. By BUFFERing the route of the Light Rapid Transit System (LRT) it is possible to identify areas that are likely to be directly affected, as above (Fig. 6.17).

The super-structure for the rail-track and the various stations along the way are also bound to be visually obstrusive. It will take not only just the width that it occupies but an added buffer for safety clearance on both sides of the track, leaving the river corridor almost unuseable for other purposes, including recreation. Meanwhile the river will definitely be obscured from view, condemning this historic natural landscape resource to oblivion and single functional use, that is, a monsoon drain.

A city-wide GIS analysis approach would very likely find that while the river corridor might provide cheap land for the LRT track to run through, at only a very limited number of points did it coincide with useful focal points

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

FEDERAL TERRITORY OF KUALA LUMPUR
LOCATION OF THE STUDY AREA

CASE STUDY 2: KELANG-GOMBAK RIVERS CORRIDOR

IMPACT OF THE LRT SYSTEM

FIGURE NO: 6.17

- NATIVE TREES
- EXOTIC TREES
- HARDY SHRUBS
- HARDY GRASS
- SOFT NATIVE GRASS
- REGULARLY MAINTAINED GRASS
- REED BED
- ORNAMENTAL PLANTING
- FORMER MINING LAND
- PROPOSED LRT ROUTE

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: VGLRT.AML

MR MOHAMED AL-HAJ
GEOGRAPHY DEPT

375

315-317

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— 99

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Mason (1988) NCE — 122
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local authority — 126
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for the mass movement of people.[41] It is at these points that the LRT might be accomodated, thus rationalizing the potentially conflicting uses of the corridor. If the analysis has also included interrogating the database for sensitive wildlife habitats, then the conclusion would be obvious that the points of conflict between good public transport requirement and the need to conserve what ever were left of the city's dwindling landscape resources, might only be minimised by routing the LRT away from the river corridor. This argument, however, could only be won if the planner had the means to present city-wide scenarios; here he would need a much better set of data in a structured GIS database than was available to the author in the present study.

Other Threats to the Kelang-Gombak Rivers Corridor

The first of such threats is the pollution as a result of both indiscriminate dumping of rubbish into the river and the systematic draining of waste and foul water into the river (Fig. 6.18). The readings taken between 1986-90 from the three monitoring stations set up by the Department of Environment (DoE) within the area have shown the level of water pollution to be extremely high and rising (Fig. 2.18).[42] These readings are compiled as an INFO file, POLLUTION.PAT for the pollution coverage so that they can be updated.

While detecting pollution is important in urban environmental management, tracking its origins and developing long term solutions are equally important. With catchment-wide database as developed by KVPCA, it should be possible to identify the possible sources of the water pollution of the Kelang - Gombak Rivers. It should also be possible to identify measures that may stop effluent from pouring into the river, once the squatter areas, up-stream mining works, illegal factories and discharge points are known. Catchment-wide policies of land readjustment may

Fig. 6.18: **River Pollution**: Effluvia from housing development within its watershed and general urban waste dumped into it, turned the historic River Kelang into a stinking open sewer. The man seen dumping the rubbish is actually a municipal cleaner in-charge of cleaning the river bank.

then be part of the strategic plan so that activities that are most likely to pollute the rivers are moved away from it and the discharge are treated before they enter the river. Monitoring so as to ensure that no new illegal activities are replacing them, and the old ones do not reoffend, then becomes a very important part of the policy implementation. GIS with its capacity of structured data storage and analysis is well-placed to serve this planning activity.

The next threat to the corridor is the encroachment by individual development such as Bank Bumiputra and Wisma Yakin (Chapter 2). There are signs now that the area that was once occupied by the amusement park is coming under development pressure (Chapter 2). If this threat materialises the only patch of semi-natural wetland in the city centre will be lost. A database system that has the early warning capability of GIS is likely to be very useful in detecting any such intrusion into the river corridor or any area where a ban on building policy is in place.

Conclusions from Case Study 2

A few conclusions may be made from the second case study: firstly the lack of consistent policy on the conservation of the river corridor due to blurred understanding of its historical and cultural importance to the population of the city; secondly the lack of a means of checking the real extent of individual development, and particularly encroachment, because data is not updated; thirdly the absence of coordinated planning and impact analysis has resulted in many overlapping but incompatible projects within a single space.

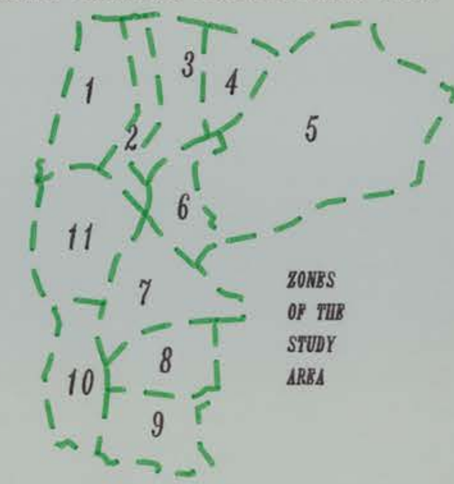
Here then surely is a good candidate for a full GIS study, recording not only the variables collected by example by the author and within the time and resources available to him, but a full range of those factors influencing and being influenced by the threat to the river resource. The author's outline plant survey data might for example need to be related to bank transects and soil conditions in addition to flow variations of the river, and not merely in this small length of the river along its full length but as a total ecosystem. Total run-off within the catchment would need to carefully assess the affects of the nature and variations in the land use patterns along the river. A detailed habitat survey might well be needed to establish for what faunal species the river acts as a corridor transit or permanent habitat, and the optimum conditions needed for each species, in and out of the water. And how all of these and probably many other factors might affect the concept and planning of any riverine park and of their likely or possible relationship with any rapid transit system. The maps (Fig. 6.15 and Fig. 6.16) barely scratch the surface of what would be required using GIS or any other planning tools. Given adequate data it should however be possible to use GIS not simply as a presentational tool as in the figures mentioned but as an analytical and prescriptive one.

CASE STUDY 3: URBAN CULTURAL LANDSCAPE RESOURCES: COLONIAL SHOPHOUSES AND HISTORICAL BUILDINGS

The third urban resource selected as a case study is perhaps the most conspicuous of all, namely Kuala Lumpur Old Town's colonial shophouses and historical buildings (Fig. 6.19). Many people would rather include these as a townscape resource, but as argued in Chapter 2, it is these shophouses that give distinct character and form to the landscape of Kuala Lumpur Old Town. Furthermore, as Byrom, J. (1980) has said "townscape" is just another name for "urban landscape".[43] Not only do these houses form the built envelopes of the myriad of urban spaces within the area, but they provide the essential texture, depth, colour and sensation to these spaces. It would therefore be

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



CASE STUDY 3: HISTORIC URBAN CULTURAL LANDSCAPE RESOURCES

HISTORICAL BUILDINGS

FIGURE NO.: 6.19

LEGEND

- GOVERNMENT BUILDING
- SCHOOL
- COMMUNITY
- RELIGIOUS
- RECREATION
- COMMERCIAL
- COLONIAL SHOPHOUSE

SCALE: 1:10000

Source: Dept. of Urban Planning, DBKL & Field Survey, May, 1991

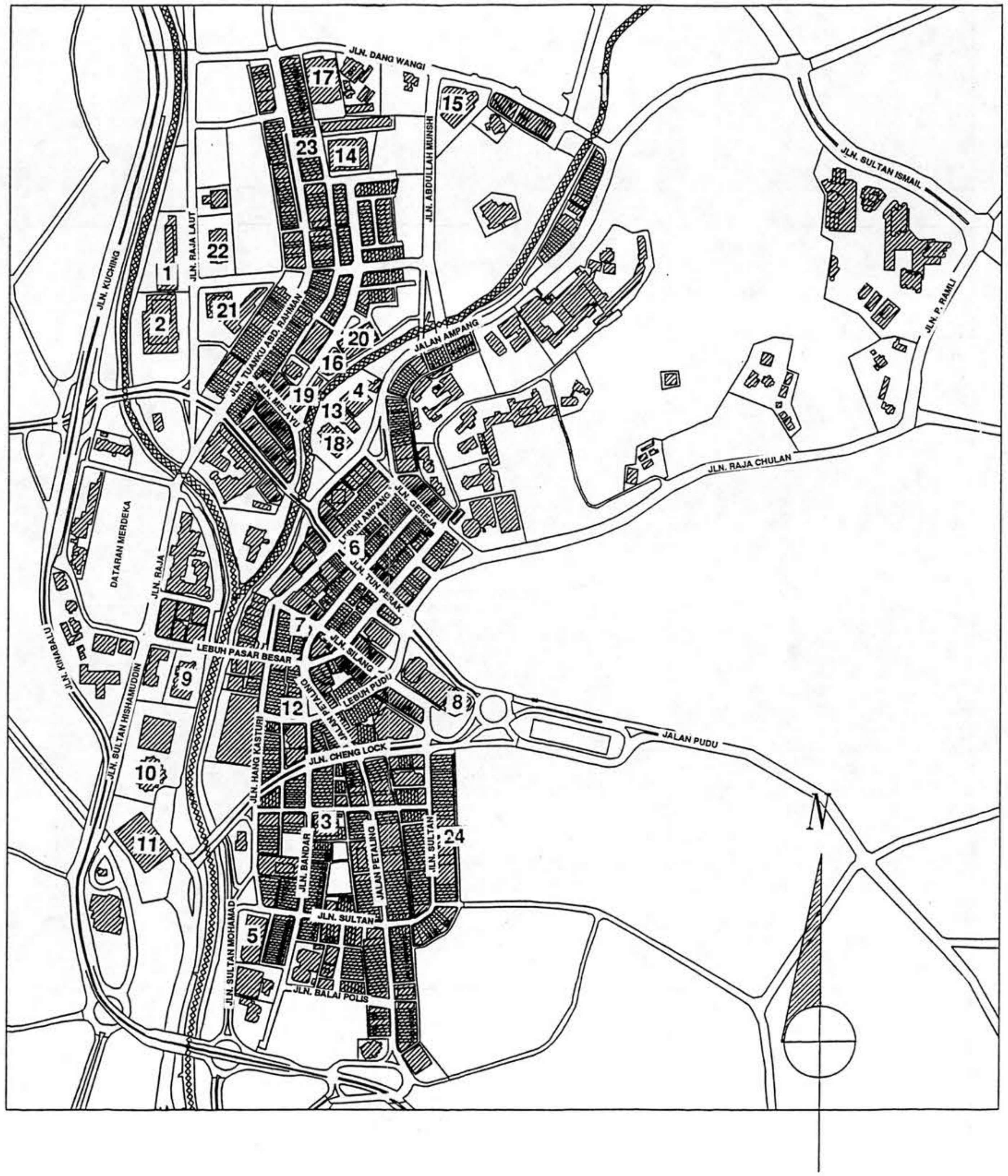
File: HSBG.AML

Compiled by Ismawi H. Zen on ARC/INFO, April, 1993 appropriate to say that these buildings are an integral part of this urban landscape.

In this case study GIS is used to build up a database from existing records which may become cumulatively more and more valuable firstly in showing the evolution of this part of the landscape of the old town; secondly in showing its rate of change and relative degradation; and thirdly in providing a tool which may be used for effective planning intervention.

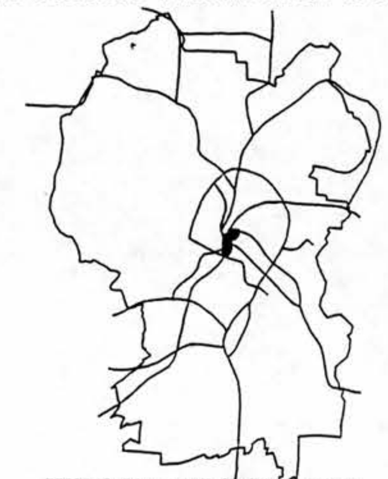
Specific streets and buildings discussed in this section are located in Figure 6.19A (see also Fig. 2.4A). The first step in the study process would be to divide the old town into sub-areas according to the concentration of colonial shophouses and historical buildings (Fig. 6.22). These sub-areas may, for convenience, be named as Zones 1 - 11. Five of the zones have a strong concentration of colonial shophouses (Zones 2,6,7,8 and 9), while two have a strong concentration of historical buildings (Zones 5 and 11). Historical buildings are also found scattered in other zones.

There is no record of how and why the shophouse building blocks were distributed in the city nor how or why they were arranged parallel to the river except that this is normal and traditional in most old Malaysian settlements. The river being the main transportation artery for the settlement then desire lines to and from it must have had great influence on the juxtaposition and orientation of buildings. The configuration of the old town has changed very little since 1881 except in the types of buildings built. The building units evolved from the simple and utilitarian Early Shophouse Style, to a First Transitional Shophouse Style, to a Late Shophouse Style and lastly to an Art Deco Shophouse Style (Appendix 5). The new style (or international style) only arrived after the World War II. The distribution of these according to style, together with a breakdown according to relative condition,



KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



FEDERAL TERRITORY OF KUALA LUMPUR
LOCATION OF THE STUDY AREA

NEW HIGH IMPACT BUILDINGS

FIGURE NO: 6.19A

LEGEND

1	P.K.N.S. BUILDING	13	DATOK ZAINAL BUILDING
2	CITY HALL	14	SEMUA MAJU COMPLEX
3	HOTEL MALAYA	15	WILAYAH COMPLEX
4	NEW CHARTERED BANK	16	MULTI-STOREY CARPARK
5	KELANG BUS STATION	17	CAMPBELL SHOPPING COMPLEX
6	TRH BUILDING	18	BANK BUMIPUTRA
7	KWONG YIK BANK	19	WISMA YAKIN
8	CHAHAYA SURIA	20	SELANGOR MANSION
9	AGRICULTURE BANK	21	PERNAS BUILDING
10	DAYABUMI TOWER	22	K.W.S.P. BUILDING
11	NEW GENERAL POST OFFICE	23	GLOBE SILK STORE
12	BANGKOK BANK	24	FURAMA HOTEL

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, May, 1993

File: STREET.AML

development status and also building height is represented in Figures 6.20 - 6.23 produced by GIS and based on the authors's survey of the total shophouses made in May, 1991. This information is represented by example to show how a total inventory by GIS might be compiled on this landscape resource for study and decision-taking purposes.

Building Condition	Units	%
Excellent	64	9.45
Good	157	23.19
Medium	342	50.52
Dilapidated	112	16.84
Total	677	100.00

Table 6.5: Conditions of Surviving Colonial Shophouses
Source: Survey, May, 1991

At the time of the survey in May, 1991 there were only 677 units of colonial shophouses still standing within the old town (Fig. 6.20). Based on the survey mentioned above, Table 6.5 above shows that over half of these shophouses were either in a delapidated condition or only fair (medium) condition, and needed urgent or at least important repair work if they were to be saved.

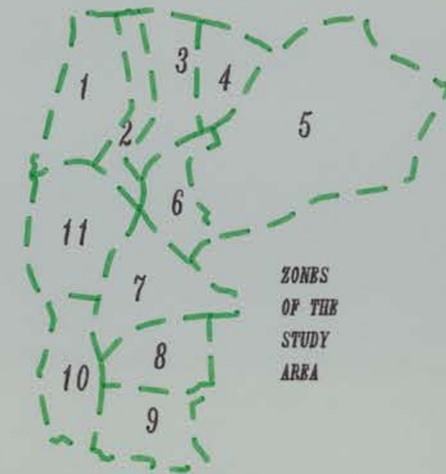
Types of Colonial Shophouse	Units	%
Early Shophouse Style	97	14.33
First Transition Shophouse Style	185	27.33
Late Shophouse Style	352	51.99
Art Deco Style	43	6.35
Total	677	100.00

Table 6.6: Types of Surviving Colonial Shophouse
Source: Survey, May, 1991

Table 6.6 above also based on the same survey shows that of the remaining shophouses, the biggest proportion or

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



CASE STUDY 3: HISTORIC URBAN CULTURAL LANDSCAPE RESOURCES

COLONIAL SHOPHOUSE BUILDING CONDITION

FIGURE NO: 6.20

LEGEND

- EXCELLENT
- GOOD
- MEDIUM
- DILAPIDATED

SCALE: 1:10000

Compiled by Ismawi H. Zen on ARC/INFO, April, 1993

Source: Dept. of Urban Planning, DBKL & Field Check, May, 1991

File: BGCONDITION.AML

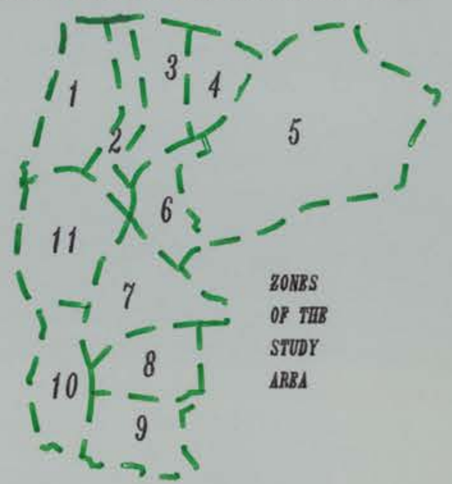
352 units (51.99%) were of the Late Shophouse Style and marked the heyday of the shophouse prosperity in the period between 1881 and 1942. Only a relatively small number, that is 97 units (14.33%) survived to represent the Early Shophouse Style, and 43 units (6.35%) were in an Art Deco Style, cut short by World War 2.

With few exceptions, most of the new buildings that found in the old town have shophouse predecessors. This means that during a relatively short period of less than 50 years (1945-91), some 447 units (39.78%) out of the total of 1124 colonial shophouses have been lost. When the distribution of these losses is represented by the GIS (see Fig. 6.21), it may be seen that while losses have occurred in all zones in the study area, zones 6 to 10 inclusive have suffered the greatest losses.[44] In 1991, there were 55 units (8.15%) with planning approval awaiting for redevelopment, and 22 units (3.25%) in the process of being redeveloped, still further decreasing the stock of the colonial shophouses and increasing pressure on the others. Such pressure was partly through thinning, and partly through relative isolation, of the shophouses in certain areas or streets. A situation clearly expressed like this should in theory not only alert the urban planners in charge to the need for specific conservation measures but also give them the necessary data for acting swiftly, given the political will.

One possibility in future planning may be the assumption that the City Hall of Kuala Lumpur opts for all the colonial shophouses and historical buildings to be conserved irrespective of the conditions they are in (Fig. 6.22). Preservation work will thus be assumed on those units which are in dilapidated condition and repair work will be carried out on those in the medium condition category. Detailed analysis of the status of those units already awarded planning approval might also be carried out to determine whether the approval could, for some technical

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



CASE STUDY 3: HISTORIC URBAN CULTURAL LANDSCAPE RESOURCES

DEVELOPMENT STATUS

FIGURE NO: 6.21

LEGEND

- DEVELOPED / MODERNIZED
- UNDER DEVELOPMENT
- DEVELOPMENT ORDER APPROVED

SCALE: 1: 10000

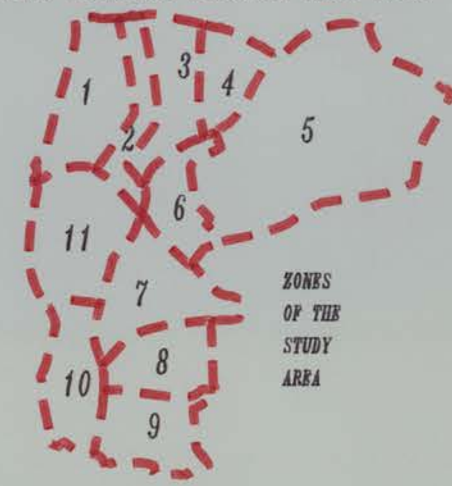
Source: Dept. of Urban Planning, DBKL & Field Survey, May, 1991

Compiled by Ismawi H. Zen on ARC/INFO, April, 1993

File: DVSTATUS.AML

KUALA LUMPUR OLD TOWN

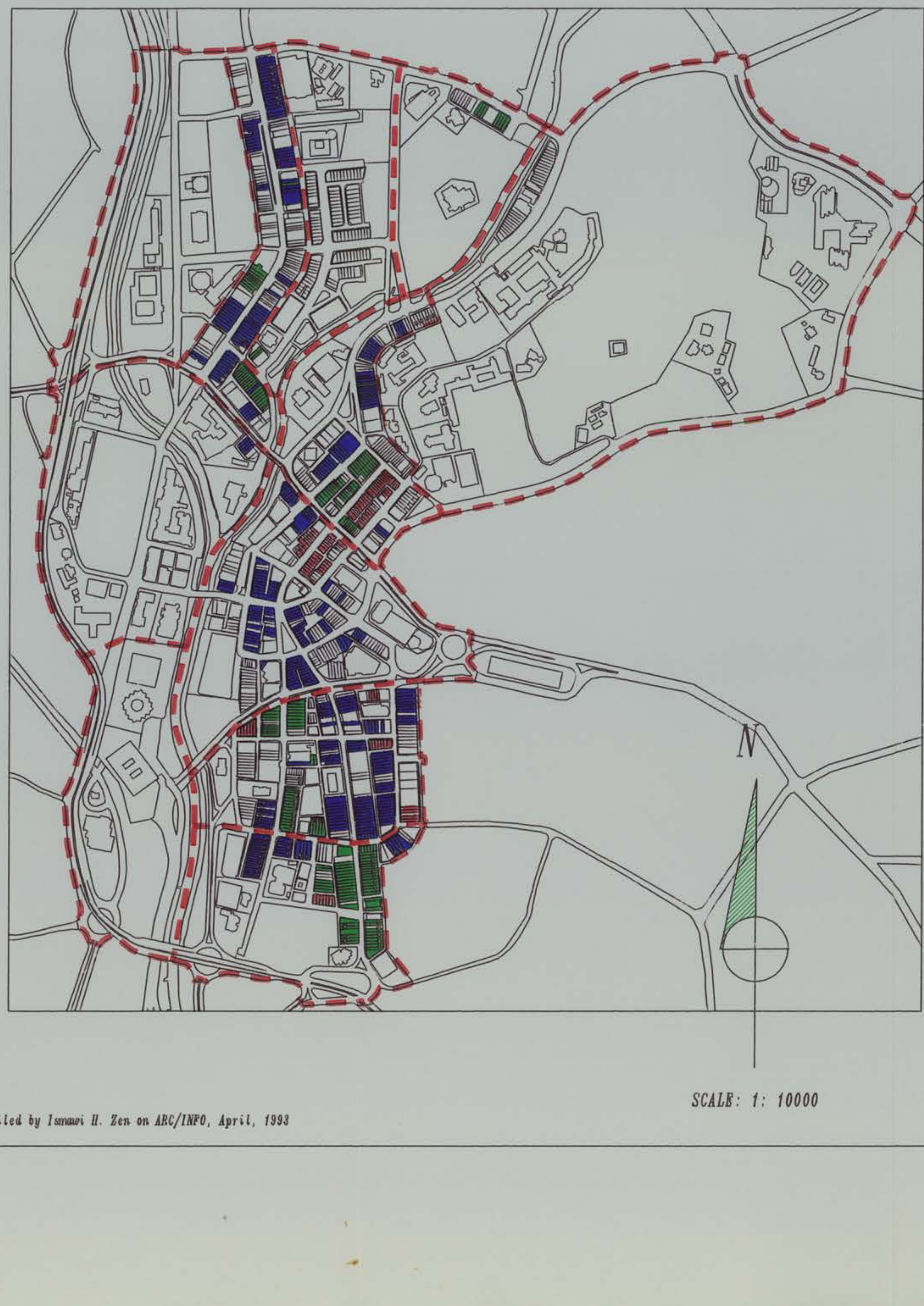
URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY



CASE STUDY 3: HISTORIC URBAN CULTURAL LANDSCAPE RESOURCES

CONSERVATION ZONES

FIGURE NO: 6.22



LEGEND

- EARLY SHOPHOUSE STYLE
- 1ST TRANSITIONAL SHOPHOUSE STYLE
- LATE SHOPHOUSE STYLE
- ART DECO SYTLE

SCALE: 1: 10000

Compiled by Ismawi H. Zen on ARC/INFO, April, 1993

File: CONSERVATION.AML

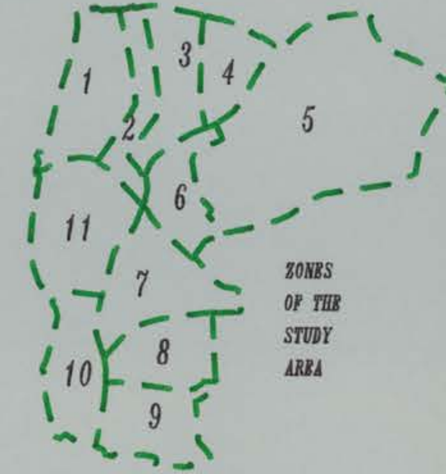
reasons, still be rescinded or the owners persuaded to be more sympathetic in their design. An example of the former might be the delay in carrying out the development order because the application had been made for land speculation purposes. Under the development by-law, reapplication therefore needs to be made once a stipulated period has expired. The latter option might then be carried out when the developer submitted an application for building approval. In this option, the city architect might impose certain conditions such as retaining the original front facade, or limiting the volume and height.

A logical consequence of this assumed policy could be the need to determine the policies to be adopted for each street or sub-area within the old town. For example, a sub-area with a concentration of the colonial shophouses and historical buildings might be ear-marked for a zonal or block conservation. This means that all other development within the sub-area could be controlled so as not to affect the character of the sub-area. As for sub-areas with thinly spread surviving colonial shophouses and historical buildings, policies specific to the shophouses or historical buildings concerned could also be developed.

Using the zonal breakdown previously expressed by the GIS in Figures 6.19-23, further analysis might be made for example in relation to building heights. With a few exceptions, the general replacement of colonial buildings with new style structures can generally be related to the vertical growth of the city (Figure 6.23). Except in newer areas, such as Raja Laut Road (Zone 1) and Masjid India - Melayu - Bunus Streets (Zone 3), the present buildings which are more than three storeys are usually replacements of the colonial shophouses. There is no dispute as to the fact that those new style buildings with three or less storeys have colonial shophouse origins. Most of the 4-5 storey buildings were built just before the Second World War and also the 6-12 storey buildings, except for the AIA

KUALA LUMPUR OLD TOWN

URBAN LANDSCAPE RESOURCES PLANNING MODEL STUDY

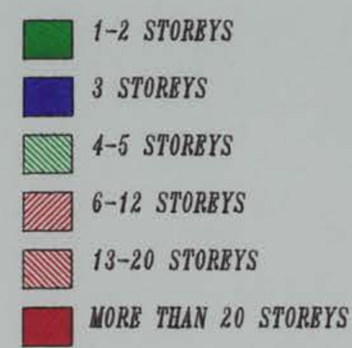


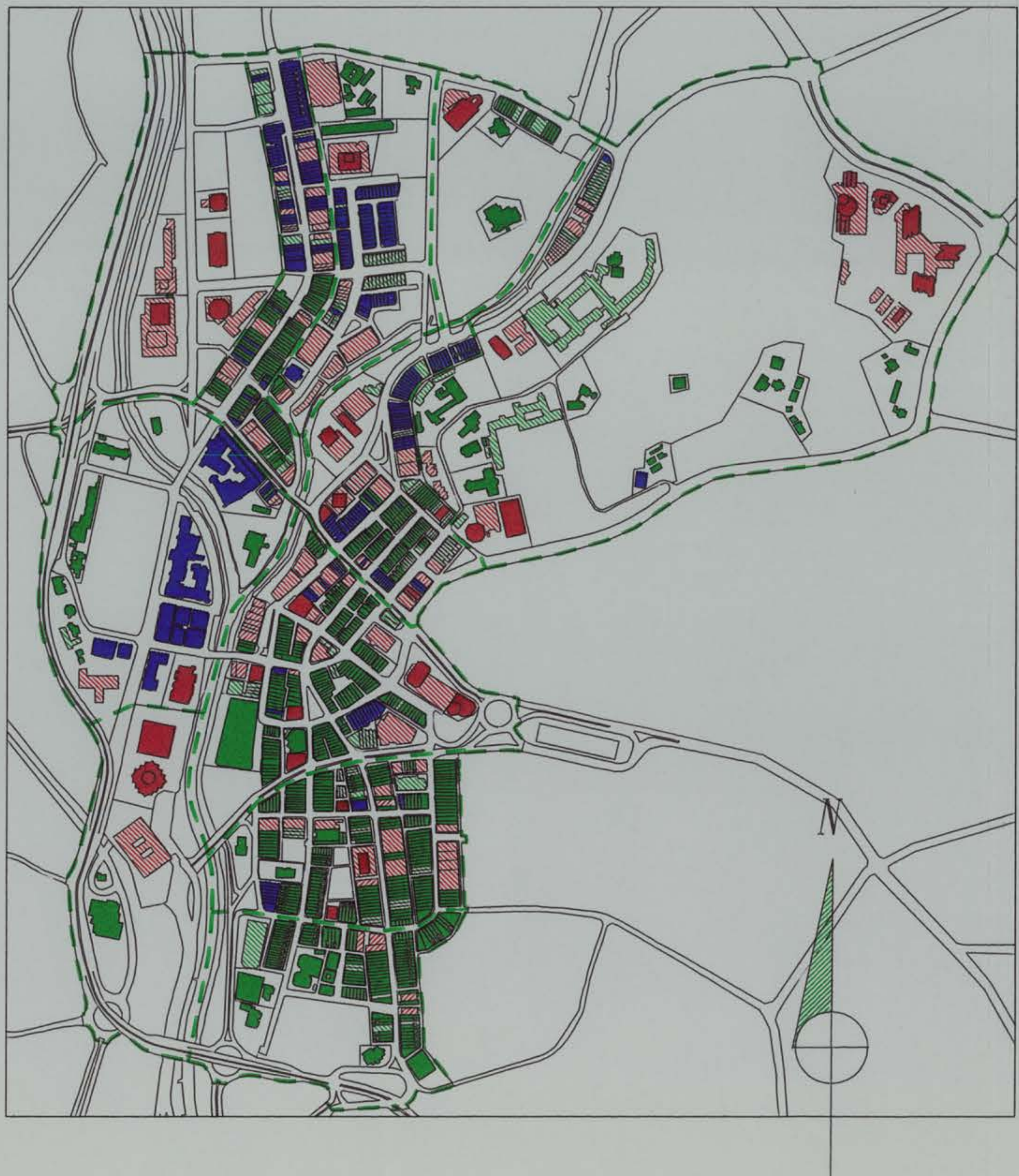
CASE STUDY 3: HISTORIC URBAN CULTURAL LANDSCAPE RESOURCES

BUILDING HEIGHT

FIGURE NO.: 6.23

LEGEND





SCALE: 1:10000

Source: Dept. of Urban Planning, DBKL & Field Check, May, 1991

Compiled by Ismawi H. Zen on ARC/INFO, April, 1993

File: HEIGHT.AML

and Bangkok Bank buildings, which were built just after Independence, and buildings of 13-20 storeys were mostly built in the 1970s. The early 1980s saw the start of taller buildings starting with Dato' Zainal Building, Bank Bumiputra, the City Hall and others. From the number of these buildings which can be easily retrieved from the INFO file, namely KBG.PAT, and by cross-referencing to other archival sources such as old aerial photographs, old postcards, maps and books and documents, it is possible to make a fairly accurate estimate of the number of colonial shophouses that have been lost through redevelopment. In fact, if so required, one would be able to recontruct, from here a fairly accurate map of Kuala Lumpur Old Town before World War II.

Until as recently as 1985, Zone 9 remained relatively unchanged. This is perhaps because of its location away from the main commercial core. However, new developments are now taking place on a number of lots in Zone 9, carried out by the Urban Development Authority (UDA) and a number of private individuals. Private individuals have redeveloped 16 units of colonial shophouses scattered around the zone. The Urban Development Authority (UDA) has redevelop 37 colonial shophouses. This means that 53 units of colonial shophouses are or have been recently demolished. The Conservation and Urban Design Unit of the Urban Planning Department, Kuala Lumpur has managed to persuade the main developer, the Urban Development Authority (UDA) to keep the original facades of the shophouses in the redevelopment. It has also been successful in keeping the height of the new buildings to an average of four storeys. It has not been as successful in persuading the others to follow suit, resulting in a totally unrelated, highrise development dispersed at random within what was once a homogenous zone.

As part of the package, the Urban Development Authority (UDA) has managed to get planning approval for its proposal to develop a multi- storey commercial complex on Lot No. 14728 which is now occupied by disused, dilapidated and timber-structured police barracks. What will come of this redevelopment will be a very odd and undesireable mixture of new buildings which have old facades and a number of high-rise commercial blocks. One consolation is that the famous Petaling Street itself will basically remain intact, except for the loss of 9 out of a total 49 of colonial shophouses. All of which points to the need to anticipate such an outcome by stronger central planning founded on a good database.

Kenzo Tange Associates (1985) in studying this same area of Kuala Lumpur as the author reached far more drastic and sweeping conclusions. These are represented in Fig. 6.24 and they involved sweeping away all the remaining shophouses in zones 1,2,3, and 6. Thankfully even without the advantage of a GIS database the planners were sensitive enough not to take Tange's advice. Tange's scheme is returned to later in the chapter. In approving, for example the Petaling Street proposal above, the authority seems to have opted for a more pragmatic and conservative in-fill development approach. Within Kenzo Tange's proposal, the whole of Zone 9 was to be redeveloped as Jalan Bandar Police Station Comprehensive Development (Fig. 6.24). Tange argued that it would be much better, and of course, easier to do than to conserve the old shophouses and historical buildings, given the necessary funds. Tange's radical proposal would have involved the building of multi-storey commercial blocks with a plaza in the centre. This proposal would have meant the loss of 4 units of historical buildings and 93 colonial shophouses - a major loss to the central area's landscape resources.

Within Zone 8, Kenzo Tange and Associates did not recommend any redevelopment, except for rationalization of the public transportation system. However, there are many redevelopments on an individual and unconnected basis that

Fig. 6.24: __Comprehensive Redevelopment of Kuala Lumpur as Proposed by Kenzo Tange and Associates.__

have either taken place, or are being carried out and are proposed to be carried out. The most important ones are the development of highrise hotels, such as the Malaya Hotel on Hang Lekir Street (Cecil Street) and the Furama Hotel on Sultan Street (Fig. 6.25). Highrise commercial office blocks are also scattered around the zone (Fig. 6.23). Another important redevelopment that has taken place is the Rex Cinema, replacing the old one gutted by fire in the early 1980s. Sadly this zone is now beyond the assistance of GIS in protecting its former landscape character.

Zone 7, which as mentioned earlier is probably the oldest part of the city, is the one that has experienced the most redevelopment (Fig. 6.23). Its colonial shophouses are now reduced to being overshadowed by monumental buildings and again beyond useful planning rescue. The most important of these new buildings are the Hong Kong Shanghai Bank Buildings on opposite ends of the Medan Pasar (Market Square), the T.R. Hamzah Kwong Hing Building situated opposite the newer Hong Kong Shanghai Bank Building, the Standard Chartered Bank that has taken over the site of the old John Little & Co. Earlier highrise buildings are Bangkok Bank, Malayan Banking, Kwong Yik Bank on Bandar Street (High Street), the Oriental Bank on Hang Lekiu Street (Klyne Street) and DBKL multi-storey carpark on Cheng Lock Avenue (Foch Avenue). At the apex of the triangle lies the most massive of all the new buildings, namely the Chahaya Suria Complex built by the Urban Development Authority (UDA) and which houses supermarkets and commercial offices.

Within Zone 7 also now appears a new type of redevelopment. This involves the preservation of the outside shell of the earlier buildings and total reconstruction of their interiors. This idea had been sold as the answer to the conservation needs of Kuala Lumpur Old Town. Among the buildings involved in this type of redevelopment is the now famous Pasar Besar (Central

Fig. 6.25: <u>Tall Buildings Mushrooming within Kuala Lumpur Old Town</u>: The planners are slow to grasp the overall impact of <u>ad hoc</u> planning decisions.

Market) which had been turned into Pasar Seni (Art Market). The massive building had been restructured by adding a mezzanine floor. It has also been air-conditioned and divided into shoplots that sell everything from jewellery to traditional fabrics and souvenir key-chains. It also houses an exhibition gallery and fast-food outlets. Other units next to it have also been conserved but with much less internal remodelling. The same was done to the Lee Wah Bank and Citibank on the Market Square. In Zone 7, given hindsight and a good GIS database it might have been possible to strike a better bargain between old and new. Given the present balance, the planners now have little option but to look to the positive virtues of the change that has taken place and use GIS to strike out boldly and make a virtue of the new.

In Zone 6 on the other hand, redevelopment has only seriously affected two rows of colonial shophouses located at its opposite ends. This has left those in the middle almost intact. Banking and financial houses have taken up both the western and the eastern ends of the zone. Bank Bumiputra, Lee Rubber, Bumiputra Security, MOCCIS, United Asian Bank, Arab Malaysian Bank, and Standard Chartered Bank have taken up positions in the western row, along the River Kelang. Lee Yan Lian and Wisma UCI take up the eastern side of the zone. An interesting development which has an equally interesting name, that is, Warisan Kita (or Our Heritage) is now taking place at the junction between Bandar Street (High Street) and Tun Perak Road (Java Road). Like the Pasar Seni (Art Market), the approach here is to reuse the facade of the old shophouses. However, this development takes it insidiously a little further and higher by adding a few more storeys to the old buildings. Whether the development is fishing on the new interest in conservation merely to "gut and stuff" or it is genuinely interested in finding a design solution to upgrade old colonial shophouses without having to demolish them is for us to see when the development is completed at the end of 1993. It is unlikely to offer much of a lead in conservation of the shophouses, and is far more likely to reinforce the arguments already repeatedly made in this study in support of a clear conservation policies founded on a thorough database.

Zone 2 thankfully has up to the present escaped relatively lightly. Relative to its length, which is about 600m., little development has taken place along Tuanku Abdul Rahman Road (Batu Road). However, now that the street is becoming more and more popular with shoppers due to an apparent shift in shopping pattern, the area is now under increasing pressure from owners who want to modernize their trade and buildings. A few highrise commercial buildings are now dotted along it. The most conspicuous ones are the Selangor Emporium, Tang Lin, the Globe Silk Store Building, and Wisma Harcharan Singh. Recently a whole block of 4 post-independence buildings with two colonial shophouses sandwiched in between them, and located right at the very top of Tuanku Abdul Rahman Road (Batu Road), have been demolished and work has started on building a multi-storey shopping complex on it. Conservation has again lost.

With the help of a planning tool such as GIS, the planners could have anticipated and forecast the above situation well in advance. This is because an overall growth analysis should have alerted them to the various developments taking place on the periphery of Zone 2 such as the newer hotels and commercial complexes just beyond the road junction.[45] Behind this block in Zone 1 is a vacant area created by the demolition of Sulaiman Court.[46] A proposal to turn this area into a shopping cum office complex with a Light Rapid Transit (LRT) station is now awaiting implementation. The other development that has recently started is at the opposite end of Tuanku Abdul Rahman Street. This involves the demolition of 5 units of colonial shophouses. Behind this development in Zone 1 and facing Raja Laut Road, is the 25 storey PERNAS Building.[47] Two other multi-storey buildings further up Raja Laut Road are K.W.S.P. Building and Chung Khiaw Bank.[48] The latter has an all-glass exterior.[49] Facing these three highrise buildings on the other side of the Raja Laut Road are the new 24 storey City Hall of Kuala Lumpur, and the P.K.N.S. Building.[50] Both were built in the early 1980s and behind them is the now containerized River Gombak. Behind the eastern rows of colonial shophouses lies a development of modern shophouses with a few highrise buildings such as Campbell Shopping Complex, and Semua Jaya Building. One therefore, can see that the row of colonial shophouses along Tuanku Abdul Rahman Road (Batu Road) will be sandwiched between two huge areas of modern buildings. However, because the rows are relatively undisturbed and the road is a major thorough-fare of shopping activities, it will still be very important for the character of the old town if the area is conserved, and further conversion of old colonial shophouses along the road halted. Reaching such a conclusion must inevitably depend on the exercise of judgement, based on experience, but both may be enhanced by having a chart record of the process just described able to be projected for example by a GIS.

A further possibility in the development of Zones 1, 2 and 3 is in Tange's proposals referred to previously (Fig. 6.24). In these, the consultants proposed that Tuanku Abdul Rahman Road (Batu Road) be included in a comprehensive development that would cover the whole area enclosed by the River Gombak, starting from the famous confluence so that it will include the Jame' Mosque, the old Town Hall - the Supreme Court and the Survey Department Building. At the Java Street Bridge the area curves into Tuanku Abdul Rahman Lane (back lane behind the Tuanku Abdul Rahman Road) in the east, part of Dang Wangi Road (Campbell Road) in the north. This development is aptly called Jalan Tuanku Abdul Rahman Comprehensive Development Area.

The gist of Kenzo Tange Associates' proposal is the turning of Tuanku Abdul Rahman Road into a central pedestrian mall. This would be achieved by making all the traffic on the road now go underground. It would also create three civic plazas: the first at the present park at the top of Tun Perak Road (Java Road); the second as part of the redevelopment of Sulaiman Court; as an intermediate civic plaza is proposed to be located at the bend of the road where the old Coliseum Cinema is located. Presently the space is being used as a car park. Other than the plazas and traffic rationalization proposal, the proposal seems to be not much different from what may happen if the present trend of development continues. The main difference however comes in the attitude toward the old colonial shophouses that have since the area's inception in 1900s been its main character and in the consultants proposed policy of encouraging the owners to transform their buildings into modern midrise buildings of about ten to fifteen storeys. It is in fact the view of the consultant that historical Tuanku Abdul Rahman Road (Batu Road) would by this means acquire a super-modern image.

Zone 11 has undergone quite a radical redevelopment. The Spotted Dog or the Selangor Club was extended in the early 1980s, with a replica but greatly exaggerated annex to provide more space and facilities for its much increased membership. The Sultan Abdul Samad Building (State Secreteriat Building) and the General Post Office Building underwent extensive renovation in early 1980s. Their domes are now copper-sheeted, thus changing their colour from black to copper. The building use has also been changed. Both buildings now house the Supreme Court and the High Courts. Their compounds have undergone extensive resurfacing work. Most of the area is now being cleanly but incongruously paved with inter-locking concrete pavers. All the planter-boxes have been done away with. Only the trees are retained. Much of the old character of this zone has now drained away for want of clear development objectives founded on agreed values derived from a thorough database.

In another part of the zone in 1986, the Jame' Mosque was enlarged to more than double its original capacity with an addition of a splendid courtyard which could be turned into prayer space during Friday congregations. However this time, the architects in-charge, Hajeedar and Associates, did such a good job that very few people realised that major extension work had been done. This was greatly helped by a measured drawing study carried out by the students from the Department of Architecture of the Universiti Teknologi Malaysia and it proved that a thorough study of a building is a prerequisite of successful conservation work and yet again underlined the value of a database. The compound of the mosque is still kept in a neat and trim fashion as it was during the early days.

Perhaps the one worthwhile conclusion that may be drawn from this short, detailed but very incomplete study is of the enormous complication of central area planning. Much of what has been described here can only be called reactive planning if it is planning at all, and in these circumstance the temptation to succumb to the possibility of a miracle solution provided by a convenient third party "outside" consultant such Tange, allows the system, if system it is, to continue by default. This particular miracle, even if it is attempted, will be bound to fail and the consultant may the be conveniently blamed, but by that time the planners and politicians will probably have long since moved on to yet more reactive makeshifts.

Given such realities, it is difficult to be optimistic about the role of urban planning without a system which may take proper account of its landscape resources. However, it may be argued that from small beginnings like those illustrated here, a GIS database may slowly aggregate a body of data which will, in clear minded and farseeing hands, offer the kind of predictive tool which will not only serve early warning of approaching problems but also give enough time for formulating sensible planning policies properly coordinated within a powerful system.

NOTES:

1.Expressed in a discussion with the author at the Registry Office, University of Wales, College of Cardiff in August, 1992.

2.The Town Planning Committee II (TPCII) includes all heads of relevant technical departments of City Hall of Kuala Lumpur such as the Urban Planning Department, the Architecture Department, the Works Department, Sewerage and Drainage Department, Traffic Management and Valuation and Property Department. The meetings are normally chaired by the Mayor himself. It deliberates over planning applications from members of the public.

3.Development of the Standard Chartered Bank at the former Benteng is an example of the strength of a corporate body. This is especially damning not only because of the historical importance of the site but also the proven connection between the planning approval and the corruption scandal involving a former Chief Minister of Selangor in 1976.

4.The name of the respective river will be given in brackets after the names of cities or major towns: Kota Bharu (Kelantan River), Kuala Terengganu (Terengganu River), Kuantan (Pahang River), Ipoh (Kinta River), Johor Bahru (Segget River), and Malacca (Malacca River). All these rivers, except Segget River of Johor Bahru and Kinta River of Ipoh, gave their name to the states they are in, indicating the importance of their role in the history of the respective states.

4.In fact in one major town, namely Johor Bahru, River Segget was converted to concrete channel in the mid-1960s. Many visitors still recalled the stench that emitted from it. The Johor Bahru Structure Plan, 1986 in trying to solve the problem of the stench and sight of rubbish and filth being dumped into it, went one stage further than the authority of Kuala Lumpur and recommended that the river now be containerized by covering the river (which in fact now is a huge monsoon drain) with concrete slabs. One cannot imagine a better habitat for disease-carrying rats (Rattus rattus jalorensis) if the recommendation is carried out.

6.This should not be mistaken for the infamous drug-producing Golden Triangle of Laos-Burma-Thailand, nor the UNESCO Southeast Asia Golden Triangle Conservation Programme.

7.Refer to UIA (1984), Vernacular, Pastiche, Modern? The Search for a Malaysian Architecture, in **International Architect**, Issue 6/1984, London, cover page and 29.

8."Talikom Malaysia" is a privatised agency formed out of the former Department of Telecommunication, Malaysia.

9.Dewan Bandaraya Kuala Lumpur (1982), **Draft Kuala Lumpur Masterplan, 1982**, (unpublished), Kuala Lumpur, p.19

10.The Aborigines, formerly called the Sakais (the "Wildmen" by the British administrators, see M.D.J. Tate, 1987, p. 92) and now renamed Orang Asli (the "Original People") because of the degratory connotation of the earlier name, are extremely shy groups of people and only come in contact with other people when it is necessary. They are divided into numerous small groups, speaking totally different languages but leading normally a semi-normadic life-style in the jungle of the Titiwangsa Range. Some tribes are found to inhabit some coastal swamps in the West Coast. The department had to move the service provided at the Bukit Nenas site to the new Centre for Orang Asli in Hulu Gombak in the late 1960s on the northern fringe of the city when the Bukit Nenas was finally caught up by development from all sides. The new site now have better facilities such as hostels, hospital and flying doctor service, primary school, administrative office and dwelling quarters for the officers.

11.The Mayor had actually lost two cases in the High Court of Kuala Lumpur in January and April, 1991 pertaining to planning approval of residential condominium developments in Kuala Lumpur. A few more similar cases are pending in courts.

12.Johnson, L.E. (1989), MAPHYD - A Digital Map-based Hydrologic Modelling System, in **Photogrammetric Engineering and Remote Sensing**, Vol. 55, No. 6., June, pp. 911-917.

13.Like the telecommunication tower previously mentioned, the "waterfall" is meant to symbolise and show the technological progress of the country. The idea that a developing country must spend huge amount on grand but imitation projects to exhibit its achievement keeps on recurring in this thesis and is itself a constant threat to the diminishing urban landscape resources.

14.The Urban Development Authority (UDA) was set by the Federal Government in 1970 to develop urban properties. Among its targets are hotels development, redevelopment of a large areas of urban centres, vacant and derelict urban lands. The authority was empowered with a compulsory purchase legislation that would allow it to redevelop areas that it identifies needing such treatment. It has its own in-house planning, architectural, property management, engineering and commercial departments. It also has a special relationship with all the local authorities, including the City Hall of Kuala Lumpur, in that most of its project would get the backing of the respective local authorities. Presently, the authority is one of the arms of the Ministry of Public Enterprise.

15.An opinion of the UDA official responsible for the development, given during an interview in May, 1991.

16.When the Portuguese captured Malacca in 1511, they set up guesthouses with Chinese brothels in them. Both the Dutch and the British tolerated these set-ups. When the British ruled the Strait Settlements (Malacca, Penang and Singapore) brothels were tolerated if not encouraged. In fact, Petaling Street in Kuala Lumpur in 1890s and early 1900s were known as the "Monte Carlo of the East" on account of the whole street being taken up by Chinese, Korean and Japanese brothels and gambling houses. Batu Road of Kuala Lumpur was also known to house European brothels (see Tate, M.D.J. (1984), p.16). Malays being strict Muslims detested anything to do with immorality and promiscuity and associated urban living with low moral standards - a reason for their initial reluctance to live in urban areas created by the British.

17.In fact since the mid-1980s, many forest reserves through-out the country had been redesignated as forest parks to cater for the upsurge of interest in tropical rainforest among foreign and local tourists.

18.The beauty and diversity of Malaysian multi-ethnic culture, countryside and natural landscape were stressed in the multi-million dollar tourism campaigns in Europe, America, Australasia and the Far East.

19.The Kuala Lumpur International Conference on Environment was called to co-ordinate the strategy of the Third World Countries in facing the Rio World Conference on Environment in June, 1992. This was felt necessary because they believed that the Rio Summit would be used to put most of the blame for world environmental problems on the Third World countries.

20.As the emphasis of this thesis is not on social changes, the survey was carried out for the sole purpose of observing perception of respondents.

21.Sidek Baba is the Dean of the Matriculation Centre, International Islamic University. He discussed the subject in his seminar entitled "**Comptemporary Issues in Malaysian Education**" at the Moray House College, Newington Campus, Edinburgh on 4th December, 1992.

22.Baba, S. (1992) also cited the case of the attachment of the former Bedouin Arabs in the now affluent societies of Saudi Arabia and other Gulf States to the deserts as a similar example.

23.A case of "Ferry Malaysia" which was originally planned as a cheaper alternative to plane travels between the Peninsula Malaysia and the island-based States of Sabah and Sarawak was pertinent one. The "Ferry Malaysia" actually became "Cruise Malaysia" in the fashion of a famous TV soap opera, the "Love Boat". Needless to say, the project failed. The next example is the Dataran Merdeka Project which will be discussed later in the chapter. The underground shopping arcade is now favourite place for louts.

24.Harrison, J.L. (1962), The Distribution of Feeding Habits among Animals in a Tropical Rain Forest, in **Journal of Animal Ecology**, Vol. 31, pp. 53-63. See also Wells, D.R. (1971), Survival of the Malaysian Bird Fauna, in **Malaysian National Journal**, Vol. 24, pp. 248-256 and MacKinnon, J.A. (1971), The Orang Utan in Sabah Today, in **Oryx**, Vol.11, pp.141-191.

25.Murphy, D.H. (1973), Animals in the Forest Ecosystem, in Chuang, C.H. (ed.)(1973), **Animal Life in Singapore**, Singapore.

26.Burgess, P.F. (1961), quoted by Whitmore, T.C. (1975), **Tropical Rain Forest of the Far East**, (1st Ed.), Clarendon Press, Oxford, p.224

27.For further examples, please refer to Whitmore, T.C. (1975) **Tropical Rain Forests of the Far East**, (1st Ed.) Clarendon Press, Oxford, pp. 10-11 and 32-40.

28.Repellin, D. (1991), **Seminar on Urban Conservation in Malaysia**, Ayer Keroh, Malacca.

29.Op. cit, p.19

30.It is noted that the government can avoid paying the huge sum for land acquisition if it redesignates the lands concern as open space or agricultural land, but this strategy is discounted because defending expected legal challenges would be too costly because the government has designated the area as residential cum commercial under the structure plan and has even gone to the extent of giving planning approval for commercial and residentail developments on the land.

31.The New Straits Times, 17th August, 1991. The exchange rate then was 1 Sterling Pound to M$3.5.

32.The figure is actually based on the construction of new bungalow (single storey detach house) in Kuala Lumpur in 1991 as the restoration work will be quite extensive, given by the Malaysian Housing Developers Association. This cost does not include land value.

33.The figure is based on the construction of a new shophouse unit in 1991 given by the Malaysian Housing Developers Association as the restoration work will be quite extensive. The cost does not include land value.

34.A study conducted by Yahya, A. (1972) in Kuala Lumpur and especially in Kampong Abdullah Hukum, found that perimeter fencing was an effective deterent for squattering activities. Yahya, A. was a urban planner with Urban Development Authority (UDA).

35.For further information on the importance and potentials of former tin mining land, please refer to Zen, I.H. (1982), **Reclamation of Former Tin Mining Land in Malaysia**, MPhil. in Landscape Architecture Thesis, (Unpublished), University of Edinburgh.

36.The study certainly did not envisage the massive housing and industrial development that took place in the 1980s and still continuing within the watershed of the river system such as Bandar Baru Selayang Township, Taman Melawati-Permata, Kepong-Jinjang Township, Damansara-Tun Dr. Ismail Township, Hulu Kelang, etc.

37.DBKL, (1984), **Kuala Lumpur Structure Plan**, Dewan Bandaraya Kuala Lumpur, Kuala Lumpur, p.162

38.Yunos, K.H. (1991) quoted in **The Malay Mail**, Wednesday 12th June, 1991.

39.The actual word used was "complement"

40.Kenzo Tange Associates, (1985), **Development Plan for Kuala Lumpur Central Area and Jalan Tuanku Abdul Rahman Urban Renewal**, Kuala Lumpur, p. 47

41.Dewan Bandaraya Kuala Lumpur (1982), **Report of Survey: Transportation Study**, (Unplublished), Kuala Lumpur. This report is part of the Kuala Lumpur Structure Plan Study.

42.One of the station is at Dang Wangi Road bridge, on the northern boundary of Kuala Lumpur Old Town while the other is at the Market Bridge, almost in the centre of the area. The third is at the Syed Putra Road Bridge.

43.Byrom, J.B. (1980), Lecture on Introduction to Landscape Architecture to First Year M.Phil students at Department of Architecture, University of Edinburgh, Oct.

44.It can be assumed that there was a negligible amount of construction during the period of Japanese Occupation (1942-45).

45.These are the Pertama Complex, new MARA Headquarters, the Resource Centre and the Holiday Inn-in-the-City Centre. A little further off along Raja Laut Road are the new Guthrie Headquarters, Plaza Hotel, Princess Hotel, the National Library, etc.

46.Sulaiman Court was one of the city's experiment with highrise apartments blocks in the town centre that has now proven to have failed (the other being the Selangor Mansion whose fate is still being fiercely debated in the city chambers). It was demolished in 1987.

47.PERNAS stands for "Perniagaan Nasional" or "Nasional Trade", a corporate body created by the government in early 1970s to break the stranglehold of traditional trade houses on the supplies and demand of consumer goods.

48.K.W.S.P. stands for "Kumpulan Wang Simpanan Pekerja" which is roughly equivalent to "Employees Provident Fund (E.P.F.)".

49.Incidently when this particular building was built, there were many others in other parts of Kuala Lumpur that had been approved by the City Hall.

50.P.K.N.S. stands for "Perbadanan Kemajuan Negeri Selangor" or "The Selangor State Economic Development Corporation (S.S.E.D.C.)"

CHAPTER 7

CONCLUSIONS AND DISCUSSION

INTRODUCTION

Writing about planning and design, Richard Neutra once said that "mankind precariously floats to its possible survival on a raft".[1] Lamenting on the instability of the two activities, he likened them to a "make-shift and often leaky raft". It is certainly true that the shaping landscape, through planning and design, though showing of marked improvement since the pioneering days of Geddes, Manning and MacKaye (Chapter 1) and especially over the last three decades with interest in landscape planning fired by articulate men like McHarg, still leaves a lot to be desired. The workings of nature and the relationships of the biotic and the non-biotic are still very far from being properly understood, and least of all within the tropics. In developing countries such as Malaysia, relevant environmental research has scarcely begun. Without it the effects of poorly based and researched planning decisions are as shown in this thesis especially damaging where they concern urban landscape resources.

Urban landscape resources express the vitality of an urban society. On one hand they trace the history of man's habitation in an urban surrounding and testify to the evolution of his culture and his power to fashion the environment according to his need, and on the other hand they define the intricate balance between man and nature. The significance of urban landscape resources must be viewed in a more holistic manner then merely socio-economic considerations. They embody the very essence of the city's persona. Through them one is able to "read" the many and chequered layers of the history and culture of the place. They create the sense of belonging for residents and the sense of place for residents and visitors alike. It is understandably difficult to quantify the human sense of attraction and love for anything, least of all landscape resources. Sometimes it is only when some of these, for example the colonial shophouses of Kuala Lumpur Old Town, are gone that one suddenly has a deep feeling that something is not right about a place anymore, and one increasingly becomes a stranger within a once very familiar environment. This is because in an intensely built-up urban area such as a city centre, landscape resources may also "provide aesthetic stimulus by reducing the inhuman scale of urban space, and by creating the micro-habitats which enable man to relate to his environment" (Laurie, 1979).[2]

The surviving stock of urban landscape resources in cities stands as testimony to the efficiency or otherwise of man's husbandry and stewardship of his urban domain. Efficient use of the resources does not necessarily result in their depletion. In fact the reverse may very well be true. Environmental conservation is a means to efficient use of resources. As Lewis Mumford put it: "When we rally to preserve the remaining redwood forests or to protect the whooping crane, we are rallying to preserve ourselves, we are trying to keep in existence the organic variety, the whole span of natural resources, upon which our further development will be based".[3] Efficient use and conservation of urban landscape resources, cannot be achieved without effective urban planning.

Environmental planning cannot be isolated to only the conservation of natural resources. Man-made artifacts also contribute to the enjoyment of the environment as they imbue man with a sense of history and continuity by providing what Lynch (1972) termed the "collage of time".[4] But as William Morris (1877) once said, "if every generation continues to 'restore' old buildings to conform to their own ideas of beauty and 'piety' of antiquity, there would be nothing left" by such heedless change.[5] The heedless changes in Kuala Lumpur wrought by the twin assaults of automobile and land speculation are mainly responsible for the loss of quality of its urban landscape through the degradation of its urban landscape resources. Environmental planning, especially in a relatively unstable and unstructured system, needs a much better approach than is available to turn this situation into a form of "controlled chaos". This may only be achieved if the knowledge about the interplay of environmental factors and relevant data about them increases in quantity and quality. The planners then should be able to respond positively by carrying more in-depth analyses and producing more reliable projections, thus setting the foundation for more effective planning.

THE MALAYSIAN URBAN PLANNING SYSTEM AND THE NEED FOR AN INFORMATION SYSTEM

Effective urban planning can only operate when the necessary conditions exist. In Malaysia, as in most other developing countries, planning activities are constrained by conflicting goals and circumstances created partly by the rapid rate of urban growth and congestion. A desire to provide an amenable and efficient urban environment conflicts with the need to conserve resources which may not be needed at once (Yaakub, 1992). It has also to contend with a popular, though arguably misguided, outlook that one can only afford to conserve after one has reached the level of a "developed nation".

Confounding the above problem, as in many other formerly colonized countries, is an emotional inclination to suppress certain parts of the national history. This may make it very difficult to see benefit in a more evolutionary approach to urban development. For example in Malaysia, this has condemned certain important resources, including the colonial shophouses case studied, to waste, first through stigmatization then non-maintainance and subsequently to dereliction and active replacement by so-called "development". This threatens not only the physical urban character of the city but also the very foundation of the urban culture. This inclination may sometimes find overt expression in thinly disguised planning policies which may have the end effect of obliterating the resources concerned. The Kuala Lumpur Structure Plan, 1984, as we have seen, has unwittingly encouraged development within the old town without clear guidelines pertaining to the conservation of its declining stock of urban landscape resources. In fact in many cases the structure plan gives very confusing signals on the matter, giving too much room for liberal interpretation of its policies and creating an almost "free for all" condition for developers.

The above problem is further exacerbated by the lack of tools to enable proper evaluation of the real impact of such policies quantitatively or qualitatively, especially at local level. By the time the planners are aware of the real magnitude and significance of development and its impact, many important urban landscape resources may already be lost. A second problem is the genuine uncertainty surrounding development patterns. This has been made harder by the difficulty of understanding the nature of the development processes, as many of their characteristics are new, and the data sources which may support further research on them are difficult to find. In these circumstances, a systematically developed database system with in-built facilities of retrieval, analysis and projection such as a Geographic Information System (GIS) may seems to be an answer. But it is not likely to be effective unless every party involved in the planning process, including the final decision-makers (normally politicians) are prepared to be guided by the data-generated findings alone. Any other considerations are likely to compromise the usefulness of such a system and it may well be a poor investment.

To be effective, urban planning by its very nature requires to be integrative in its approach. That is to say it has to be able to efficiently integrate the many political, environmental and socio-economic concerns and variables. There are a number of important obstacles in the way of a full integrative approach to urban planning. The first of these is the purely physical identification and classification of relevant environmental data. The second is the apparent conflict between environmental, cultural and socio-economic objectives and between these and politics. Lastly, there is the difficulty just mentioned of integrating the concerns and objectives of urban landscape resources into the mainstream urban planning process.

On the first of these difficulties the thesis presents an argument for the identification and classification of urban landscape resources as either urban cultural or urban natural resources. Methods of identification and assessment of these resources are also discussed (Chapter 5).

On the second difficulty, the thesis discusses the close connection and relationship between the two types of urban landscape resources. As Laurie (1979) again put it: "Urban man may regain his love of the city through its reflection of the close relationships that exist between man and nature, and which create cultural values".[6]

Effective urban planning depends very much on the ability to efficiently integrate the many variables, both environmental and socio-economic. In Malaysia, this ability is very much curtailed by the need to address the numerous political and socio-economic problems that all seem to need simultanous and immediate attention in the first stage of development. The following stage seeks to target a "developed nation" status through industrialization. While the first stage generally affects the rural areas, this second stage largely affects the urban areas.

Accordingly, the thesis study has aimed first to examine the possibilities of developing a structured

Geographic Information System (GIS) database for urban landscape resources, then to use the best available data by examples, to show the impact of modernization and industrialization on the welfare of the limited landscape resources in urban areas in Malaysia with special reference to Kuala Lumpur Old Town. To do this the relevant general goal and objective statements of the relevant structure plan, namely the Kuala Lumpur Structure Plan, 1984, was translated into sets of more objective operational criteria; these then provided a basis for the development of a resources database which might provide the planners with readily accessible information pertaining to their daily task of planning; and performing eventually not only descriptive but also prescriptive functions given adequate data.

In the first instance, the data is stored and retrieved to provide information describing a situation at a certain point of time. An example of this may be seen in the third case study, namely the Colonial Shophouses. The database was used to describe the existing situation of the resources, such as their declining number and resulting haphazard character of the old town, and the loss of the elements of cultural identity and heritage. In this way the planners might be made aware of the cumulative implications of their previous decisions and policies.

In the second instance, the database might provide information about a situation when one set of data is related to one or more other sets. In the first case study, data on the vegetation of Bukit Nenas Forest Reserve was sketched in relation to the historical buildings sharing the hills with it (Fig. 6.2); raising the possibility of a matually beneficial solution to the problems and threats they are both facing. A database might then be seen to perform a descriptive function by laying out the present situation. GIS might then carry out a searching analysis into the relationship either between the resources or between each of them and an introduced element such as the proposed development or policies, and "diagnosed" resulting conflicts. By studying the possible causes of the conflicts and the available options to solve them, it might prescribe possible solutions. This means that the system within which the database is placed must allow for the data to be retrieved and viewed in as many forms as are necessary for the analyses concerned.

The continuously changing relationship between its elements, makes data on the urban environment continuously in a state of dynamic flux, necessitating an equally dynamic approach to urban planning. Urban planning is getting more and more complex. Urban development plans can no longer be looked upon as simple land use and traffic management concepts. The planner's conception of an urban system for instance must now incorporate the concept of sustainability and cultural development. In Kuala Lumpur Old Town, planning is thus faced with the problem of nurturing economic growth while at the same time ensuring that this growth will not result in the obliteration of its natural and cultural landscape resources. No where is this more true than the case of Bukit Nenas Forest Reserve; its continuing as a functional amenity depends absolutely on how effective the planners are in integrating the requirement of rapid development surrounding it with the reserve's conservation programmes. In such a situation, the planning authority must increase its effectiveness through innovation and flexibility. The complexities of the problems must all be resolved through simulation of alternatives which are examined through structured analyses and investigations. A pertinent example here is the persistent flash floods problem of Kuala Lumpur. A simple solution of swiftly draining away the excess water by straightening the river, seems only to bring more flash floods (see Appendix 6). Furthermore, the solution proposed engineers is likely to result in the loss of one of the most important natural and historical resources of the city. A structured analysis, with good quality data on the likely increase of water during an average rainfall and which is related to the carrying capacity of the river, simulated in three different scenarios, namely existing, straighting, and delaying flow options, should have resulted in a more sustainable solution.

Accordingly the planning systems in Malaysia need to greatly improve on the present manual paper-based data-filing system in order that a better understanding of the problems and subsequently a more effective control of these problems may be achieved. An information system is part of the mechanism for reducing uncertainty in the knowledge and understanding of the environment. The development of Geographic Information Systems (GIS) should, in theory, provides a tool which can contribute to a clearer understanding of real planning problems as well as to prescriptive planning scenarios to enhance the quality of urban planning and management. For example, in the second case study, namely the Kelang - Gombak Rivers Corridor, by using the GIS Polygon Overlay Operation, it is possible to see even with very limited data the general extent of the conflict between the three main proposals for the river corridor. Given the availability of additional data such as detailed alignments of the proposed Light Rapid Transit System (LRT) and the concrete walls on the river banks, it is possible to see the real extent of the conflicts between these and the proposed riverine park on the provision of urban open spaces in Kuala Lumpur. The "ecological soundness" of each proposal may also be evaluated if detailed data on the existing vegetation, wildlife and ecological zones of the corridor are stored within the GIS database. By storing plant species data as point elements, it is in addition possible to do a Polygon-over-Point overlay operation to find out the exact number of plant species that are affected by each proposal. By using the "impact polygons" derived from the analysis carried out in Chapter 6, and if the plant species are stored as polygons of communities then a Polygon-over-Polygon analysis, that is, "Impact Polygons-over-Community Polygon", will give the first indication of the extent of the damage to the plant communities existing in the corridor. A further overlay with the mapped territories of known riverine wildlife such as River Otter (Cynogala bennetti) or Kingfisher (Halcyon concreta) may indicate the possible damage to their habitat. If information pertaining to the wildlife's minimum viable limit is known, then the planner may be able to forecast whether the proposal will in fact lead to the decline or extinction of wildlife within the riverine corridor. This test may also be applied to the riverine park proposal to find out the degree to which it has incorporated the ecological sensitivity of the existing plant communities and wildlife of the river corridor. With the existing imperfection of the data, it is not possible to undertake these analyses, however, the case study at least shows how a systematic investigation might be carried out using the Geographic Information Systems (GIS) technology.

In time, given the assumed decreasing cost of Geographic Information Systems (GIS) and of computer technology in general, it may be argued that even in a developing country like Malaysia, Geographic Information Systems (GIS) will have a useful role to play in urban planning. This was observed by Habitat (1985) in commenting that the "use of inexpensive but sophisticated data management systems is of particular importance in developing countries, since it can facilitate timely information flow in situations where extensive technological and financial investments are not possible".[7]

The continuing trend in setting up municipal information systems, has the potential to be harnessed for local authorities such as the City Hall of Kuala Lumpur

(Masser, I., 1990).[8] The possibility of setting up a more comprehensive urban information system in which urban landscape resources would form a part has been discussed in Chapter 5 and its initial usage illustrated Chapter 6. An urban information system acts as a tool to facilitate planning activities, either to provide data during the development of planning options or subsequently to support a planning decision.

In addition to Geographic Information Systems (GIS), there are a number of other computer-based technologies that are likely to be helpful in the Malaysian urban planning such as cartographic modelling, remote sensing and Computer-Aided Design (CAD) (Cowen, D.J. and W.L. Shirley, 1991).[9]

The first tool, namely, Computer-Aided Design (CAD) has proven to be very useful in aiding design of buildings and other three dimensional forms. It is based on a preprogrammed vocabulary of shapes, forms, symbols and shades making it a very useful tool for visualization such as simulating perspectives and views. In urban planning it is best suited to help in urban design studies where shapes, masses, volumes and views are very important. It is also useful for a study which concentrates on the reconstruction of the architectural history of an urban setting (Alkhoven, P., 1992).[10] This type of analysis would have been a very helpful extension of the analysis carried out in this study, especially in relation to the colonial shophouses of Kuala Lumpur Old Town. While the GIS database set up was used to assemble an inventory of the shophouses and historical buildings, and to analyse to some extent the loss and degradation of the resource, Computer-Aided Design should be able to pick-up the analysis from there and to perform townscape analysis of the area. This may be done either to help contain the problem by identifying the most critical townscape element left, or by projecting a situation in which new development may be made to be more sympathetic with the spirit of the existing character, thus creating a more harmonious urban environment than the present chaos. To do this, a reconstruction of the area may be modelled by the computer for the purpose of understanding the underlying forces in the urban design of the area.

LANDCAD, a landscape-dedicated CAD software, is also quite useful in small-scale landscape design. Like other CAD softwares, it is based on a vocabulary of shapes, symbols and shades. It has some database capability enabling analysis of earthwork and crude cost implications. It also has a limited but useful database of plant species, both in terms of forms, shapes, characters and suitabilities. However, like all CAD-based softwares, because it cannot handle non-physical attributes, its capability to analyse aspects relevant to the environment such as ecotype, soil capabilities, plant species and pollution levels are very limited indeed. It usefulness would have been limited to selecting suitable sites for chalets and other structures proposed within the eco-tourism park because of its versatility in slope analysis and three dimensional presentation. It would have not been able to identify the types of plant and wildlife species that may be affected.

The second tool, namely, cartographic modelling is basically computerising the normal map-making process (Tomlin, C.D., 1990).[11] It works with a limited map vocabulary such as colours, shapes and symbols. It has very limited up-date capabilities. An example of the product of this tool is the yearly road maps produced by the Automobile Association (AA). The tool does not have any analytical capability, making it of limited use for normal planning activities. In this thesis study, the usage of cartographic modelling would have been restricted to presenting on maps the data previously collected on the area through the use of other means such as field survey or remote sensing.

The third type of tool, namely remote sensing, is another technology that is increasingly proving to be a very useful tool for planning activities. However, its usefulness is limited to data collection only. This technology is used quite extensively to assemble information related to open spaces, land use, vegetation cover, topography and relative building age. In this study, remote sensing was used to identify woodland and other natural landscape areas, types and height of buildings, land surface conditions such as derelict land and former mining land, river course and bank types. It was also used to identify colonial shophouses and other buildings that have been lost. However, the official restriction on the use of aerial photographs and other types of remote sensing materials, in Malaysia, and their general outdatedness, strictly limited the scope for the use of this technology in this thesis study. Given better access to the aerial photograph archive, it should have been possible to assemble relevant data to enable a historical study of the loss in real terms of resources such as native woodland and open spaces, a method well tested throughout Europe and based on progressively better data since World War Two. It should also have been possible to use such a sensing to study the gradual degradation of the Kelang - Gombak Rivers Corridor and the gradual displacement of colonial shophouses with new buildings. One would then have been able, perhaps, to understand better the reasons for the shrinking of the urban landscape resource stock. Another type of remote sensing material that may have been very useful for this study is satellite (LANDSAT) imagery. With such a tool it would, for example, be possible to identify the major ecotypes within an area such as Bukit Nenas Forest Reserve. By studying in detail the different tones of the colour of the forest imagery, it should be possible to identify the areas of different ecotypes to focus ground study of the local ecosystem (Johnston, C.A. and J. Bonde, 1989).[12]

The main advantage of GIS over these three alternative planning tools is its ability not only to provide a systematic and referenced database but also its capacity to allow easy update, retrieval, analysis and simulation; its main disadvantage, at least for the time, being is its relatively limited ability in 3 dimensional presentation and analysis.

To address the complexities of the situation within which the urban planning system of Malaysia operates, it may be useful to reflect on the numerous theoretical functions of urban planning. Meyerson (1956) collapses these functions into five broad categories: central intelligence, pulse taking, policy clarification, detailed development planning, and feedback and review (Cowen and Shirley, 1991).[13] All these functions have direct relevance and impact on the management of the existing local urban landscape resources.

The first function, namely central intelligence, requires that a planning organization maintains a comprehensive repository of relevant planning information, including spatial information such as urban landscape resources. Geographic Information Systems (GIS) should in theory be able to provide tools to assemble the diverse forms of spatial information into an integrated format that will improve the ability of planners to detect and discern underlying major trends that are occuring within the community.

The second function, namely pulse taking, serves as an early warning system and requires an ability to analyse the existing conditions and to project underlying trends in development. Here too GIS may play a useful role in aiding such analyses by relating disparate and seemingly isolated information. This function is especially important for the task of implementing conservation policies related to vulnerable elements of urban fabric such as urban landscape resources.

The third function, namely policy clarification, requires that the planning authority carry out policy clarification through comparison of alternative scenarios arising from various alternative development policies. In an environment of ad hoc decision-making that characterises the daily task of urban planning, this function is extremely important. It is only through the ability to compare scenarios that the optimum choice can be made while at the same time making sure that the dynamic nature of urban planning and urban development is sustained. The versatility of GIS in undertaking analyses and projections promises great potential in this task.

Unfortunately again due to the poor quality of available data, the case studies fall far short of demonstrating the full potential of the system. They might for example be improved not only by upgrading the quality of data but also by incorporating certain important ecological and viewshed analyses into the system. The first of these might require detailed data including types of wildlife and their special needs, for example the wild-berries they feed on, the type of plant species that they normally build their nests and shelters in, and their local natural predators. In other words, the study must reveal the basics of the food-chain and trophic levels of the ecosystem that exist locally. This data should then enable the planners to understand that keeping "some" parts of the forest reserve alone is not enough to sustain the natural elements that are critical to the success of the proposed eco-tourism park, leading to a clearer understanding of the "design limits" of such a proposal.[14]

The fourth function, namely detailed development planning, may be best served by an information system which has an integrated database such as GIS. This is because detailed development planning needs not only spatial and tabular information in various format and scales, but also a system that has the ability to present objective resolutions to conflicting suitabilities such as the utility and amenity of a resource. In the Kelang - Gombak Rivers Corridor case study, it would have been possible for example to expand the analysis further into finding a viable solution into the persistent problem of flash floods while at the same time keeping the natural look of the river as a linear park. This might be done by the system interrogating the database for areas along the corridor that may suitably serve as flood water retention ponds and which may be permanently or periodically filled with water. The former will double as a series of either ornamental lakes or water-based recreation areas while the latter may be important wetland areas during normal days. There would then be a presumption against building in these areas. These will cancel out the need for rapid draining of surplus water as in the present option and subsequently avoid the need to straighten and build a concrete wall along the full stretch of the river except in areas that need physical strengthening. The retention ponds can certainly be incorporated into the design of the riverine park, making the design of the park an integrative design exercise rather than a cosmetic one and not solely concerned with the narrow corridor of the river itself. If this analysis is to be carried out, detailed information on the local rainfall, water intake points, topography, land use (especially vacant and former mining lands with existing depressions such as mining pools), land ownership, buildings and structures, historical sites and spots, major plant species and riverine plant communities, and soil is needed. With all this information stored within the GIS database, it should be relatively simple for the planning authority to monitor any encroaching developments.

As for the third proposal, namely the Light Rapid Transit System (LRT), a study of the focal points and the main flow of mass movement of people within Kuala Lumpur Old Town, and the noise level projection should help to reroute it away from the river corridor. If for some reason, it passes by the river corridor then these points may be located by asking the GIS database for areas where the conflicts and damages are likely to be minimal, for example where it passes by heavily built-up areas such as between the Java Street Bridge and the Munshi Abdullah Bridge. In this way, using a Geographic Information System (GIS), a fine balance might well be achieved between exploitation and conservation of such an important cultural and natural resource.

The fifth function, namely feedback and review, bears directly upon the statutory requirement of periodical review in the Town and Country Planning Act, 1976. Its ability, in theory, to undertake perpetual updating of information should make GIS particularly well suited to serve this function. Despite the system's probable high initial cost, information can be updated almost daily as planning approvals and development orders are made. This should mean that extensive and costly statutory data updating exercises carried out every five years become unnecessary. Furthermore this should ensure that every planning decision is based on current information. However, before this can be achieved, the local authority will have to put expensive investment into developing a systematic collection of data to make up, for example, the gaps identified in the case study data of this thesis. This cost may be reduced through progressive input of data to a structured database, not as an additional chore for the research units like that of the Kuala Lumpur Urban Planning Department, but as a refinement and thus to create a progressively more valuable improvement over the present paper-based data filing systems.

EXPERIENCE WITH THE CASE STUDIES TOWARD A KUALA LUMPUR OLD TOWN URBAN LANDSCAPE RESOURCES PLANNING MODEL (KULAND)

KULAND looks to be a decision-support model which is developed to utilise the various facilities of the GIS technology to assemble a structured database of the urban landscape resources of Kuala Lumpur Old Town. Once in place it may, in theory, be used to initiate systematic analyses of the effects of "planned developments" on these resources. By using the capabilities of GIS, it is possible to classify and finally map out the various categories of landscape resources. By assembling raw data such as buildings in a structured database, the data can then be retrieved as in the case study about colonial shophouses and historical buildings as they reflect the concern of the public on their conservation, such as historical buildings in their various sub-catogeries like religous, commercial, or institutional buildings. A more detailed breakdown of the data such as the facade styles, former and present usages, historical associations, and development status of the buildings may be retrieved from the same set of raw data. Similar operations may be carried out on the vegetation data. One might, for example, be able to map areas dominated by certain species of plants, as was done in the Bukit Nenas Forest Reserve case study (Fig. 6.1); or one may be able to generalise the vegetation information into just natural landscape areas and modified landscape areas to give a broader perspective of the situation.

Inspite of its limited demonstration in this thesis, GIS information retrieval is not just a mapping exercise. The flexibility of a GIS model should enable the examination of various options by highlighting the probable general impact on them of development proposals. For example in the first two case studies, namely the Bukit Nenas Forest Reserve and the Kelang - Gombak River Corridor, the model is used to examine the implications of various sketch proposals. These gave at least a general indication of the degrees of either conflict or possible damage they may have upon the limited but highly valued landscape resources. In this way, at least in theory the best available and most practical course of action may be recommended. The model set the foundation for more in-depth analyses into the problems and these may be undertaken as the data and the technique progressively improve.

Tactical decision-making which characterises urban planning activities at local level lies between strategic planning and operational programmes (Miller, D., 1986).[15] Although it is possible to define and describe the various planning problems, they are too often complicated by competing interests, incomplete information, or poorly developed assessment techniques as well as political and organizational considerations. This may lead to the argument that modelling should be extended to provide support at the tactical levels where decisions need to be steered, for example, between politically motivated projects which in the end become threats and hazards to the sustenance of the resources concerned. This only shows that planning is seldom a clean theoretical process which can expect to use its techniques infallibly.

The purpose of such tactical modelling may therefore be to improve the effectiveness of the decision-making process (Sprague and Carlson, 1981).[16] The first characteristic of such a decision support model is its likely need to serve a variety of decision types. It will be more effective where there is enough structure for computer and analytical aids to be of value and where judgement based on these is an essential component of the decision-making process. It is noted that while a wide range of other planning techniques can play their parts here, GIS is well-placed to carry out such a role.

Secondly tactical modelling may also extend the range and capability of a decision-making process to help improve its effectiveness. The case of the policy on relocating the

Bukit Nenas schools to the fringe of the city is a pertinent example here. By incorporating the needs such as to conserve the schools as important historical relics of the past, and the need to realise maximum returns from a valuable piece of property which presently is economically dormant. Tactical modelling here involves searching for a solution that might generate economic returns but at the same time preserves the schools by turning it into a youth hostel cum training centre, exploiting the present booming eco-tourism industry in the country. Another part of the tactical modelling exercise is by ensuring the schools are preserved, it would lessen substantially the speculative developments that might be attracted to the eastern fringe of the forest reserve. This will have the desired end effect of conserving the Bukit Nenas Forest Reserve as it is critical to the sustenance of the eco-tourism park project or the present status quo. It is noted that this decision might have been more obvious if data related to the volume and the characteristics of eco-tourism and the flora and fauna of the forest reserve were available to enable the development of specimen tour packages of the forest reserve using the SEARCH operation of the GIS (Appendix 7).

With a more adequate database, it should be possible to generate information that might be used to demonstrate either the financial or the environmental advantage of each step in the chain of tactics involved. It would also as in the four alternatives presented in the Bukit Nenas Forest Reserve case study be able to indicate the advantages and disadvantages of selecting an option.

Lastly the KULAND model may create a supportive tool under the control of the decision-maker which does not attempt to automate the decision process, predefine objectives, or impose solutions. Even though the model is loose enough to respond as well as possible to many factors including political imperatives outside the provisional planning process, it is well-placed to be an educational tool in the decision-making process for while it gives the decision-maker almost limitless freedom of actions, it cautions him with the projection of consequences of such actions. This is particularly important for a developing country where the planning process is relatively unstable and unstructured, as it is only through practical experience and learning that an "appropriate" decision-making process will eventually evolve.

CASE STUDIES: AN ASSESSMENT OF THE GEOGRAPHIC INFORMATION SYSTEMS (GIS) IMPLEMENTATION.

In this thesis, a Geographic Information Systems (GIS) approach has been employed to assess by examples some of the implications of development projects that have apparently gone through the thorough scrutiny of the existing planning systems in Malaysia. The three case studies show how available data may be supplemented to develop a working though very incomplete database of urban landscape resources of Kuala Lumpur Old Town.

In order that a representative set of resources were picked up in the case studies, a set of three criteria were used to select them. The first case study, namely the Bukit Nenas Forest Reserve, is based on it being a unique landscape resource; the Kelang - Gombak Rivers Corridor is based not only on a river, being the most common natural and cultural resource of any major town in the Malay Peninsula, but also on its being threatened with problems of unique and incompatible developments; and lastly the colonial shophouses and historical buildings were chosen as they are perhaps the most common elements of urban heritage in Malaysian urban centres and threatened paradoxically by the very rapid rate of development and modernization.

The first two case studies demonstrate the possibility of creating smaller databases from a main GIS database, so that only the "duplicates" of the parts that are directly concerned with the case studies are accessed, thus minimising the chance of the main database being "corrupted" either accidently or intentionally by the users. This process starts with a CLIPping operation on the areas concerned, automatically creating relevant sub-databases while keeping the main database intact. The third case does not involve the creation of a sub-database but an isolation of analysis activities on a single file of the main database, in this case, the "Building file". The activities demonstrate in sketch outline the inherent ability of a GIS database to ensure the integrity of its data content and to avoid accidental loss when it is being accessed and used, thus showing its potential as a suitable "host" for a central database.

In the first case study, using a very incomplete database, the Bukit Nenas Forest Reserve, the objective was to assess in outline the impact of a proposed transformation of the forest reserve into an eco-tourism park, and the various developments either proposed or already taking place on parcels of privately-owned lands adjacent to it. By BUFFERing the various elements of the proposal such as nature trails, buildings, and roads it was possible to estimate the general degree of impact. By drawing the information from the INFO file created by the overlay operations, it was found that while the forest reserve would be suffering varying degrees of impacts from all types of development proposals, the proposals for the eco-tourism park and especially its viewing tower were likely to be extremely damaging. The knowledge on this impact would for example have been more refined if data such as the exact volume and height of the tower, its servicing and access, the nature of its construction technique and type of adjoining areas of resultant bare surface that would increase the surface run-off had been available.

On this latter point, a Digital Map-based Hydrologic Modelling System (MAPHYD), may be incorporated into the main KULAND model. This GIS model utilises a "stream search" operation to interactively analyse the movement of surface run-off using raster format. In this way the most likely movement of the surface run-off might be simulated.[17] To use this model the grades of the surface are firstly calculated and mapped. By dividing the forest into cells, the size of which should best reflect the changes in average grade and elevation, the speed and most probable route of the flow of the surface run-off when it rains, may be calculated, thus enabling an estimation of areas that are affected. The types of soil and land cover not only determine the water-flow coefficient over each cell but also the erosion coefficient of the cell that is eventually used in calculating the amount and spread of soil erosion. Detailed analysis of the surface elevation may then determine the areas most likely to be affected by sedimentation due to the existence of depressions or flat areas. Such factors will help refine the knowledge about the species of plants and wildlife of the reserve that might most likely be affected.

If such analyses are to be carried a step further to determine in detail the impact on the resources affected, through some form of "ecological accounting", then a clear understanding of the ecology of the rainforest is necessary. Presently knowledge and research in this field is both slight and of questionable relevance, and its mainly refers to rural and very remote areas of the Malay Peninsula (Harrison, J.L., 1962, Wells, D.R., 1971); excepting perhaps a study carried out by D.H. Murphy (1973) on the animals of Bukit Timah Forest Reserve in Singapore.[18] This latter study is certainly relevant as the reserve concerned is also a relict forest, except unlike Bukit Nenas Forest Reserve of Kuala Lumpur Old Town, the Singaporean forest reserve is located outside the main urban development zone of the island republic. These studies reveal a few aspects that may be taken into account such as the need for detailed information on types and distribution of wildlife, plant species, special habitats such as for example salt licks for bigger mammals and mud-ponds for the insects as well as local sources of food for the wildlife. With detailed information on such subjects it might then be possible to map out different territories for each important species using ARCPLOT. It would also be possible to assemble an inventory of plants with their locational reference on the maps using INFO. For example, while one might be able to map the territory of a resident band of Dusky Leaf Monkey (Presbytis obscura) after a careful on-site continuing observation, one should also be able to map the distribution of the trees whose leaves provide the main dietary requirement of the monkey. This top-of-the-canopy inhabitant which feeds mainly on leaves and fruits should provide a useful indicator as to the welfare and the health of the forest if it is being encroached on by development.[19] Unlike its near relative, the Pig-Tailed Macaque (Macaca nemestrina), the Dusky Leaf Monkey (Presbytis obscura) is a shy animal and would certainly be adversely affected by development within its habitat.[20]

By overlaying, in turn, the maps of the monkey's territories and feeding habitat with one that shows the areas most likely to be affected by the various proposals as shown in Chapter 6 and maps of areas affected by erosion, a relatively accurate extent of the impact of the proposals may be simulated by GIS. The next stage of the study might determine whether areas which are relatively undisturbed but fragmented by the proposed development are quite enough to sustain the monkey or any other wildlife that are critical to the success of the eco-tourism park. This step requires information relating to the minimum area of forest in terms of the habitual range of the monkey to survive, described as "minimum viable limit" (Johnstone, K, 1987).[21] Information relating to its lifestyle such as its "social structure", feeding habits, favourite shelters, and resistance to contacts with human are likely to be critical to the study. Equally important may be a thorough understanding of other elements of the monkey's food-chain such as the plant species that form its main dietary requirement, their pollinating habits, reproductive cycle, associations, and micro-climatic regimes. Similar study may be carried out for other important wildlife indicator species such as the Mousedeer (Tragulus kanchil), the Three-striped Palm Squirrel (Lariscus insignis jalorensis), the Malayan Pangolin (Paramanis javanica) and the Thick-beak Pigeon (Treron curvirostra).

External influence on the forest reserve may also be important, such as the habit of the Fruit Bat (Chironax melanocephalus) in visiting and feeding on the wild fruits in the forest during the night, helping their pollination and reproduction. This may require a much bigger study as it is at present only a speculation that the bats are from the group that inhabit the limestones caves of Batu on the northern fringe of the city. Even if they are, the bats themselves are now threatened with extinction by the very fast sub-urban development taking place around the limestone hills and from expansion of the Hindu temples within these caves.[22] Other external factors include, of course, the flocks of birds, especially, wild pigeons (Treron sp.) which visit the reserve. The degree to which these external factors are affected by development such as the proposed multi-storey commercial developments that will surround the forest reserve is also at present only speculation, even though this information seems to be vital for the future of the area either as an eco-tourism park or in its continued use as just a forest reserve.

Presently it is impossible to know all the facts above, despite the enormous benefit they may give when trying to convince the decision-makers, because of a general lack of relevant detailed scientific research. This means that, the case studies of this thesis provide only a sketch outline of a thorough impact analysis on the wildlife of the forest reserve. However, given the availability of better quality data, the Geographic Information System (GIS) should be able to carry through the necessary analysis as it has not only the ability to present maps of the areas concerned but to report such information as the sizes and constituents of fragmented areas, for comparision with minimum viable areas for the sustenance of the wildlife concerned.

A further stage of the case study might be an interactive analysis to help develop a better detailed design solution to the proposal of the eco-tourism park. This study might require the same data as above, except that the Geographic Information System (GIS) would use a SEARCH command by interrogating the database for areas that have the least impact on the elements critical to the survival of the forest and its wildlife - quite similar in fact to the old manually based "Sieve Analysis Technique". As in the old technique, by providing the search operation with a set of criteria, namely those that should be avoided and those that should be looked for, the planner, this time using Arc Macro Language (AML) to programme appropriate commands on ARCPLOT software of ARC/INFO, should be able to map out the areas where the siting of each of the proposed activities will have the least impact on the welfare of the forest reserve. If some form of graded or weighted criteria is used then the study should result in a set of graded suitability maps.

The structure plan's proposal for relocating the Bukit Nenas schools and replacing them with highrise commercial establishments, though expected to bear economic benefit, would actually have a very severe impact on the forest reserve. By undertaking a GIS viewshed analysis of the hills with the proposal for commercial and residential condominiums simulated on them, it would for example, be possible to map areas of the forest reserve that cannot anymore be seen from the main roads around it because of the proposed tall commercial buildings, thus depriving the general public within the city of the view of the green hills. The usual soft green skyline that has been one of the main characteristics of the old town since its inception in the mid-19th Century will also be sorely missed. With the present breed of GIS software (ARCTIN), a viewshade map is produced by laboriously undertaking sight visibility analysis from every known angle. The one improvement this offers over the present manual system is that it only involves identifying a sequence of two points of a view, and the calculation is done by the computer with pre-programmed commands.

An estimation of the relative noise disturbance initially from the construction activities, and later of the daily commercial activities may be undertaken by GIS if the database is fed with information relating to the actual lay-out, masses, volumes and heights of the proposed buildings and the types of commercial activities within them. The real problem with GIS here lies in its current inability to visualize the buildings in three dimensional forms. It offers instead a two dimensional building plan draped over a three dimensional ground surface (an example is shown in Fig. 1.2). As discussed earlier, there are presently, other systems that are capable of this kind of three dimensional presentation such as most Computer Aided Design (CAD) softwares and LANDCAD, but most of these are incompatible with the ARC/INFO software used in this thesis study and of very limited use other than in three dimensional projection as disussed earlier in this chapter.

Another example of the use of Geographic Information System (GIS) in urban planning may be in the generation of viable alternative development plans. In Chapter 6, an example of a sketch set of three alternatives was generated for the development of the Bukit Nenas Forest Reserve. These were then compared with the proposal for the eco-tourism park. Even with a very imperfect data and the inherent limitations of the technique, the exercise was able to frame these alternatives and to aim at the same general objective, namely the conservation of the forest reserve. A lesson learnt here was that even with a crude Cost-Benefit Analysis, it may be possible to explain with some measure of clarity the advantages and disadvantages of each particular course of action. Because the general format of the database and analyses are already in place, the real magnitude and extent of the impact of each will increasingly be better understood as the data on soil, plant species and wildlife is progressively improved. We should therefore be able to approach a point at which we may estimate with some degree of accuracy how many species would likely be affected by the development of the forest reserve. This is, however, dependent on long term research.

In the second case study, namely the Kelang - Gombak Rivers Corridor, presently it is impossible to carry through the analysis to show the precise number and species of riverine plants and wildlife that may be adversely affected. To study the real impact of the flood mitigation project, the most important relevant data is likely to be the width of each section of the banks to be modified and its existing and proposed grades, the types of plant and wildlife species within such width and as part of the larger riverine ecosystem - at least along the affected lengths of the river and preferably seen whole along its total length. The data about the riverine habitats of wildlife such as the Wak-wak (<u>Actophilornis sp.</u>) should enable analyses similar to those suggested on their counterparts in the Bukit Nenas Forest Reserve, to determine their ability to survive the proposed development. Unless the present attitude of treating the river as a huge monsoon drain for the city is changed soon (as in the case of Singapore River more than a decade ago), the survey data needed to support such a planning exercise is likely to come too late for the GIS to be of any use.

Information on the average existing and proposed water-carrying capacity of each stretch of the river after the so-called "improvement" work, and the projected speed of flow during certain intensities of rain should for example enable a "stream search" analysis to be simulated to forecast the possibility and impact of flash floods as a result of the proposed changes, and using the ARCPLOT facility of the GIS (see Appendix 7). In such a study, the river may be divided into convenient sections of say half a kilometre in length. With the gradients of the cross and longitudinal section known, also the friction coefficient, and holding capacity of the section, the speed of the water flowing from section to section may be calculated. A section that is unable to drain away its content in a given time will then overflow the banks, creating a flash flood at this point. A comprehensive analysis of the whole stretch of the river should identify the most flood prone areas of the city. This information should of course be already available from the Department of Drainage and Irrigation (Kelang River Unit). However, due to the extreme difficulty of acquiring data from this source as explained earlier, the inter-relationship of these variables cannot be demonstrated. If the local authority later decided to set up such a database, it would have to acquire this data through intra-departmental agreements.

Equally important in the Kelang - Gombak Rivers case study, though less dramatic, is the accumulated impact of the isolated and disparate developments on the edges of the river corridor. It should, in theory, be relatively simple to find relevant information pertaining to privately sponsored developments on lands abutting the corridor, were it not for the inherent weakness of the present data holding system. This again is a further support for the case for a central GIS database system so that the unit will have ample warning of not only the individual but more importantly the cumulative impact of "developments" along this sensitive corridor. A GIS database with a preprogrammed command that alerts any possible incursion into or consequence influencing the corridor must be better than the present manual filing system database in use. In order to set up this GIS system, the coordinates of the exact boundaries of the corridor must first be stored within the database. However, at the moment even these cannot be properly identified by the planning department.

By using the same evaluation metholodogy as above, it may be found that even with the poor data available the urban cultural landscape resources, especially the colonial shophouses, are experiencing unacceptable pressure from both comprehensive development schemes and isolated developments. An example of the former is the case of Station Road Comprehensive Development being carried out by the Urban Development Authority (UDA). The proposal by Kenzo Tange on Tuanku Abdul Rahman Street Comprehensive Development would have a similarly devastating impact on the urban landscape resources and character of the area. It is however, the isolated developments and dilapidations that have the biggest cumulative impact on the shophouses.

Unfortunately this impact is less apparent to the urban planning authority due to its incremental nature and the inadequate means of demonstrating this by using the present manual data file of this information. The lack also of a means of projecting the trend over time means that the authority is unable to percieve the real impact from this direction. This weakness may be rectified with a GIS technique. A database that has all the particulars including the existing classification of types, use, material, historical associations, ownership, locations (zone, street and block), age, and lot numbers of the buildings when fed with relevant information required for a planning permission will certainly trigger enough warning as to the possible change of the building characteristics.

The GIS-based system should also be useful in contextual study of a particular planning permission by simulating its attributes. The system may, for example, highlight changes in floor space, or to the general skyline of the zone, the changes to the general street facade, and most importantly the changes to urban activities that the proposal might trigger.

Despite the lack of adequate data and the consequent "improvisions" that were forced on the case studies, it may therefore be seen that GIS offers uses that may be harnessed in a data-poor and less than perfect urban planning system in Malaysia. It usefulness in attempting an holistic view each time a "development" is contemplated on a small part of an urban area such as Tange's proposals on Tuanku Abdul Rahman Road, would help to minimise the risk of mistakes. In this way it may also help in keeping the overall planning goals in view in the face of the not too infrequent "contingency planning". Not only would it help to bring about a methodological approach to a certain planning issue, it but also to add objectivity and rationality into the decision-making process. Finally also it may help to enhance the credibility of a given planning decision within an apparently more integrated approach.

To summarise, therefore, the likely benefits of using Geographic Information Systems (GIS) for urban landscape resources within urban planning may include the following:

i) The ability to store, retrieve and analyse very large quantities of geographically referenced data of very diverse origins;

ii) The establishment of a database readily updated as required for later evaluation and planning;

iii) The ease of conducting analyses such as impact analysis, once the database is established: In-depth studies of impact of development on the various resources being possible if improvements are made to both the present data assembly and analysis; and the effectiveness of the analysis may be increased.

iv) More flexibility should be afforded in the process of evaluation using an interactive approach. An example of this would be the suggested "stream search" analysis that may be used to simulate the river flow following certain levels of rainfall to help forecast the occurance of flash floods and to design a flood mitigation system that may double as a more effective riverine park than is proposed.

Several other major issues are encountered in the use of the GIS technology in the course of this study which need summary and further discussion here. The first of these concerns the creation of the database itself. A major obstacle to GIS implementation in the urban planning context remains the very large volume of both cartographic and attribute data that has to be converted into machine-readable form. Coupled with this are the problems created by the paucity and often poor quality of available data in Malaysia, as in many other developing countries. This compelled the researcher to undertake the laborious task of verifying and transforming case study data to a common format readable by computer. Aronoff (1989) observed that this task represents at least three quarters of the time of developing a database. Experience in this study shows this estimate to be quite true.

Data inaccuracies are the result of a combination of factors. The first is the system of data storage employed by the various data-holding agencies such as the Urban Planning Department, Kuala Lumpur, the Department of Works, the Drainage and Irrigation Department, and the Department of Environment, Malaysia. There is no unitary system of data storage (Nor, 1990). Confusing record systems that do not discriminate between the existing and those that are still in planning approval stage are a constant source of inaccuracy. Much of the data is anyway out-of-date, thus needing as in the case of the data presented in this study, extensive review on the part of the researcher. Undue rigidity in the interpretation and implementation of the Official Secrets Act (1985) adds to the problems of collecting data even for academic research such as this.

In common with many other developing countries too, studies on environment are still in their infancy in Malaysia, hence the difficulty of collecting coordinated and reliable data on the various aspects that are being studied such as vegetation, wildlife, soil, hydrology, and history. In the absence of this data the author in this study has sought to use raw data available from a range of sources on aspects such as water pollution levels and building details. As these studies were for specific purposes, only raw data could be extracted from them. It is in this respect that GIS can perhaps make the most contribution to urban planning generally and to urban landscape resources in particular. This is because once the data is collected and stored in an appropriate format it may then be released in any format according to the requirement of the user and may be easily updated.

The second issue raised by GIS in this thesis concerns the database users. If GIS for urban planning are to be sustainable and effective, they should form part of a wider local authority information concept (Yaakub, 1992). A section responsible for developing and maintaining the databases should be set up. It would serve as a source of information to cater for other sections responsible for strategic and local planning, development control and enforcement. Eventually, the local authority information system may take a technical form of a multinode networked environment. This would enhance computer awareness among the staff within the various departments as well as among the decision-makers. There are two related issues here: firstly the cost of setting up such a system, and secondly the time it will take for the system to be readily available for the users.

On the first issue, it is up to the local authority and the central government to decide that the cost will be a good investment. With the present trend of very active modernization of government departments in Malaysia as part of the overall drive toward a "developed nation" status by the year 2020, the relative cheapness of setting up a modest system seems not beyond both levels of government.[23] The problem of transferring the information from the present paper-based system to computer-readable media is bound to be more difficult. However, if there is a long term strategy which initially involves the feeding of all data related to new projects into the system, followed by gradual input of those related to individual planning applications and lastly a major input during the existing five-yearly statutory review exercise, the overall database development may be ready within a decade. This, of course, must be preceeded by the general referencing of the study area. This is normally done by setting the coordinates of the boundaries within a Topological Identification Coordinates (TIC) File.

On the second question of time-scale for its availability too it is anticipated that the main system would not take too long to set up. The training of the general users, such as the technicians and the system operators may take some time. Because of competition created by the present general lack of trained personnel in the field, there are bound to be quite substantial losses, especially to the private sector with its better monetory inducement. This will affect continuity and the organizational stability of the department that operates the system. This is presently one of the major problems in Malaysia (Masser, 1989). It may be supposed with some confidence that this particular problem will greatly diminish with the steady increase in the number of Malaysians acquiring the expertise.

The introduction of such a system is bound to cause doubt and scepticism among staff used to their present methods and routines. Initial reluctance, resentment, and even opposition from many quarters, not least from the people who have personally benefitted from the chaos of the present system such as the politicians may be anticipated. However, the present trend towards a "cleaner" and more accountable government should only help such a system to be set up.

CONSIDERATIONS FOR EFFECTIVE USE OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) IN AN INTEGRATED URBAN PLANNING SYSTEM IN MALAYSIA

The main objectives of an urban planning agency may be stated as the need to stimulate and guide "balanced development" within a city. The term balanced development here implies a dynamic and sustainable progress in social and economic conditions and which reflects a parallel growth in the standard of living as defined by the facilities and amenity of urban living. In this latter aspect, environment expressed in the forms of the various urban landscape resources plays very important roles.

As discussed in Chapter 3 (page 119), the philosophy of planning may be thought of as "top-bottom" although occasionally now there is a trend for it to incorporate the reverse.[24] In the first view, planning is seen as primarily concerned with producing comprehensive plans and adopting them for implementation. In Malaysia, the comprehensive plan has now taken the form of structure plans. The development process of these plans involves collection and analysis of large volumes of data, in an attempt to be as comprehensive as possible. The time taken to complete the data collection, analysis, formulation and adoption of these plans makes it inevitable that the data, and by extension the plans themselves, are normally out-of-date by the time the process is completed.

In order that the plans are dynamic, as they should be, they need to be more flexible in their attitude to the planning process. At this point, it is perhaps useful to bear in mind that the current Malaysian national strategic plan, namely the New Development Policy (NDP) is for a period of 30 years (1990-2020). Within that period, there are bound to be many changes that may affect the way the country should be developed. These may, in turn, affect the way the lower hierarchy plans such as the structure plan and the local plan, which are of 15 years and 5 years time-span respectively, interpret the national goals and objectives. GIS, with its ability to accomodate almost perpetual updating, has the means and potential of data assembly and projection to take into account the long term implications of these plans provided it is well supported by greatly increased and continuous data assembly and necessary long term research. While it may be able to provide the up-to-date data for the structure planning and local planning exercises, it may also be able to help the planners develop more comprehensive understanding of changes that take place almost daily. By doing this, the national strategic plan, despite its long time-span, is always updated with the necessary feedback from below, making it a dynamic plan. In this context, it is perhaps useful to be reminded that the last tiger emerging from Bukit Nenas Forest Reserve was seen, shot and consumed just before the Second World War, when the forest reserve was just about to be surrounded by residential areas; how long, at the present growth rate and with the present complacency and ignorance, will it further encroachment to irreversibly destroy the forest ecosystem? If a GIS database had sufficient data, it should in theory be able to answer this question.

In the light of these changing roles of planning, Manheim (1987) suggested there should be two main objectives for Geographic Information Systems (GIS) in planning agencies in developing countries.[25] The first is to provide support to traditional planning activities, orientated to "top-down" planning. The second is to provide support for the role of agencies as a catalyst to social and economic development by exploiting the power of such information technologies. Experience in Malaysia suggest the aptness of both these suggestions. This is because within a developing and relatively unstable economy, the personal inclination of the country's leadership can sometime be a critical force in the way development is planned and carried out. This situation normally necessitates some form of central planning. In Malaysia, as seen, this takes the form of the national strategic plans such as the New Economic Policy (NEP, 1970-89) and the New Development Policy (NDP, 1990-2020). Physical planning then takes the role of refining and translating these strategic policy plans. The effectiveness of such planning therefore depends a great deal on a sufficiency of up-to-date and good quality data. It is in this respect that the real concern shown by the present leadership in the environment and landscape should be exploited to the fullest to lay a strong foundation for future planning; a powerful planning tool like the GIS can only help this cause.

An example of Mannheim's second objective may be seen if the database of the system is continuously updated and overall trends are periodically identified, then it may help to establish the short-term, intermediate goals and development policies while still keeping within general strategic goals and objectives (Bruton, M.J. and D. Nicolson, 1985).

Isolated and ad hoc attempts at improvement are at present being made in Malaysia that may yet achieve both of Manheim's objectives but this may not be in the very near future. The Ministry of Land and Regional Development, through the Directorate of Surveying and Mapping is trying to create a comprehensive image-based database. While at more local level, the Urban Planning Department of Kuala Lumpur is creating a character-based database of land uses. The Malaysian Agricultural Research Development Institute (MARDI) is making an effort to start developing a database on soil suitability for agriculture. An even more ambitious programme is being initiated by the National Remote Sensing Centre in Kuala Lumpur. The Kelang Valley Planning Coordination Agency (KVPCA) which is trying to coordinate planning effort for the whole of Kelang Valley (of which the Federal Territory of Kuala Lumpur is a part), has just called for viable proposal from the private sector to set up GIS database of land uses within the valley. All these should point to a promising future for the role of the technology in the various types of planning in the country. However, many aspects such as isolated and uncoordinated development, difficulty of acquiring accurate data, incompatibility of data, poor research base, sophistication and limited capability of the technology itself, make it most unlikely that this will be the case in the near future.

Drawing on the experience of this study it may be observed that to be successful GIS must first complement the existing resources and skills available to planners and be designed to accommodate changes in their working environment. Secondly the system should be integrated with other data sources such as databases and maps. Thirdly, it must allow data to be manipulated, that is, aggregated, analysed, projected, modelled and mapped in a flexible way through user-friendly interfaces. Lastly, it will have organisational consequences which affect both the agency using the system and their relations with other agencies which are involved either directly or indirectly in the planning process. It will take some time for the above goals to materialise. The experience for example of Swansea City Council in Wales, has shown that even in a country with a very strong town planning tradition, it is envisaged that it will take at least a decade for the database to reach a comprehensive level suitable for most planning and other local government activities in the United Kingdom (Bromley, R. and M. Coulson, 1989). How much longer the same process will take in Malaysia remains to be seen. If the trend of modernization in the country continues at its present rate, the demand for such a system to cater for its rapid rate of development may be expected to intensify. However, many of the basic ingredients of the system such as adaptive learning, overall information technology, organizational stability and personal commitment are not in place yet, either in Kuala Lumpur, or in the rest of Malaysia. Until these problem are overcome, it is difficult to see such a technology being used widely.

In considering the application of Geographic Information Systems (GIS) to the Malaysian planning system, it is useful also to be reminded that the process of landscape design and landscape planning has a further very particular need and that is its dependence upon an adequate inventory of environmental resources, many of which are still very imperfectly understood and which may require many years of further patient scientific observation. Nowhere is this more true than in our real understanding of the tropical rainforest; of its processes of energy take up and transfer, of the relationships between its trophic levels and still more importantly the extent to which these may be modified by man without permanent structural damage to the ecosystem. Clearly planners cannot wait for the results of such fundamental research. The Bukit Nenas Forest Reserve, for example, would simply be swept aside. But even over as short a period as this thesis study, given even modest assistance in the field, useful comparative data might be collected by local planners to identify indicators of change and which the GIS and other planning tools might then use to project and forecast in future planning. The help even of school children might with imagination and good supervision achieve results comparable with those achieved in Britain by the late Dudley Stamp in the early days of its own land use planning. Given the increasing refinement of such data and the technology itself, Malaysian planning and its use of GIS can only improve.

In conclusion, being a relatively new technology, and in the relatively imperfect context of Malaysia, the use of GIS in landscape design and planning is at present admittedly limited, especially concerning its three dimensional presentation, visualization and analysis which is still strictly confined to landform and surface analysis and this is a distinct disadvantage in urban planning. As stressed in this study, the technology will probably be best and first used in Malaysia to help develop policies on the general strategic use of an area and its resources. Its further use in more detailed design in Malaysia is likely to be very small indeed until the system itself is improved.

One other major drawback of the system is its "user-unfriendliness". Unlike other design-orientated softwares, GIS softwares such as ARC/INFO needs not only good understanding of the principles and concepts of the systems, but also of its operational functionalities and commands. Map production is still dependent on the relatively old precept of computer-programming, even though this have been greatly simplified by the Arc Macro Language (AML). Presentation of maps is limited for example as we have seen to a combination of four colours (black, red, green and blue) and a combination of hatchings; and on a big scale, maps such as those used in this study, are not always easy to read. While this difficulty may very likely be overcome in the near future, the general criticism of

GIS that it is too sophisticated for everyday use in a Malaysian context is probably fair. One is therefore reluctantly compelled to accept that for the moment while GIS is likely to be useful in Malaysia as a tool of planning data assembly and retrieval, that it cannot of itself be relied on to be an easy or convenient tool of analysis in its present form within Malaysia's relatively unstructured and unstable urban planning environment; but given this structure and stability, and a much reduced level of sophistication in its application, there is no reason why GIS should not eventually become an extremely useful planning tool.

FINAL CONCLUSION

The intention of this thesis has been to explore the means of bringing a proper consideration of urban landscape resources into Malaysia's planning process, and examine in particular the opportunities of doing this by using GIS. The study has shown how Malaysia's principal city of Kuala Lumpur grew, firstly in response to the demand for tin; it has described the form of this growth, dictated largely by a colonial British administration, before the days of professional town planning; and it has shown how these forms were shaped, largely by considerations of public safety from hazards like fire and flooding, and also others concerned with public health.

The study has illustrated Kuala Lumpur's distinctive legacy of built and unbuilt forms at its river junction site; and the special sense of place which these confer; and it has described the threat to this sense of place and the sensible appreciation of the landscape resources supporting it. In three case studies it has identified specific landscape resources needing to be properly accounted for in the planning process, and it has discussed how GIS might be used to help such accounting.

In the course of the study the author has learnt many things. Firstly how the planning of a modern city grows daily more and more complicated. Secondly, how a lone researcher journeying around the edge of bureaucracy and darting in and out of it may quickly appreciate its monolithic clumsiness and its unfeeling lack of response in meeting needs obvious at least to a single pair of eyes trained in planning and landscape design. Contact with many parts of Kuala Lumpur's planning bureaucracy has again and again proved its lack of effective intercommunication, and that improvement in the quality of its decisions depends greatly on improving the means of communication not only within its bureaucracy but with its many companions in government.

Lastly and perhaps most importantly it has shown, within the limited reach of one research worker, how information technology, and in particular, GIS, offers great hope of such improvement. The case studies have however shown that this by itself is not enough; and that for all the improvements in the means of planning and in the appreciation of the resources planned, real improvements in living conditions and the physical expression of cities like Kuala Lumpur will not come about unless supported by the insights of decision-making based on sound and reliable information. Without this, none of the tools of modern information technology will in themselves improve the quality of the planning process or its product. If then, GIS is introduced too quickly in the Malaysian planning process on behalf of landscape and any other resources it is likely only to replace one kind of oversimplicity with another; and Nature itself was never simple.

NOTES:

1.Quoted by Lyle, J.T. (1985), **Design for Human Ecosystems**, Van Nostrand Reinhold Co., New York, p.v

2.Laurie, I.C. (ed.), (1979), **Nature in Cities**, John Wiley and Sons, Chichester, p.xvii

3.Quoted by Dasmann, R.F. (1968), **Environmental Conservation**, John Wiley and Sons, Inc., New York, p.349

4.Lynch, K. (1972), **What Time is This Place?**, Cambridge, Massachusetts, MIT Press, p.96.

5.Quoted by Kain, R. (1981), **Planning for Conservation**, Mansell, London, p. 5. In 1877, William Morris founded the Society for the Protection of Ancient Buildings (SPAB) in England.

6.Op. cit. p. xviii

7.Quoted by Yaakub, A. (1992), **The Application of Geographical Information Systems for Urban Planning and Management: A Case Study of Squatter Settlement Planning in Kuala Lumpur, Malaysia**, Unpublished Ph.D Thesis, University of Edinburgh, p.383

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12.Johnston, C.A. and J. Bonde (1989), Quantitative Analysis of Ecotones Using a Geographic Information System, in **Photogrammetric Engineering and Remote Sensing**, Vol.55, No. 11, November, pp. 1643-1647.

13.Op. cit, p.298

14.The case of Mimaland, a nature-based leisure centre sited just twelve miles to the east of Kuala Lumpur is very pertinent here. The important elements such as big emergents and wildlife of fragmented remnants of the natural forest did not survive as well as they should be. It was then (1976) thought that soil erosion and noises were the main causes, however detail observation by the designers of the proposed Bukit Nenas Eco-Tourism Park on the failure of Mimaland would have helped them come up with better proposals - certainly minus the view tower and the chalets.

15.Miller, D. (1986), Land Modelling in Tactical Planning: Potential Use and a Decision-Centred Approach, in Gelinas, R., D. Bond and Smit (eds.) (1988), **Perspectives on Land Modelling**, Polyscience Publications Inc., Montreal, Canada.

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17.Johnson, L.E. (1989), MAPHYD - A Digital Map-based Hydrologic Modelling System, in **Photogrammetric Engineering and Remote Sensing**, Vol. 55, No.6, June, pp.911-917

18.Harrison, J.L. (1962), The Distribution of Feeding Habits Among Animals in a Tropical Rain Forest, in **Journal of Animal Ecology**, Vol. 31, pp. 53-63. See also Wells, D.R. (1971), Survival of the Malaysian Birds Fauna, in **Malaysian Nature Journal**, Vol. 24, pp. 248-256 and Murphy, D.H. (1973), Animals in the Forest Ecology, in Chuang, C.H. (ed.)(1973), **Animal Life in Singapore**, Singapore.

19.Harrison, J.L. (1962) defined six communities of birds and animals in tropical lowland evergreen rainforest, like the Bukit Nenas Forest Reserve, based on the level they occupy and by the range of foodstuffs: (1) Above the canopy: insectivorous and carnivorous birds and bats; (2) Top of canopy: birds and mammals feeding largely on leaves and fruits and to a minor extent on nectar and insects also; (3) Middle of the canopy flying animals: mainly insectivorous birds and bats; (4) Middle of the canopy scansorial animals: mixed feeding mammals which range up and down tree trunks from crown to ground, a few are carnivores; (5) Large ground animals: herbivores and attendant carnivores; and lastly (6) Small ground or undergrowth animals: mammals and birds of varied diets taken from the forest floor, predominantly insectivorous or mixed feeders, plus some herbivores and carnivores.

20.Pig-tailed Macaque or Beruk (*Macaca nemestrina*) seems to thrive very well in habitats frequented by man, such as in the Penang Botanic Garden, Penang.

21.Johnston, K. (1987), Natural Resource Modelling in the Geographic Information Systems Environment, in **Photogrammetric Engineering and Remote Sensing**, Vol. 55, No. 11, November, pp. 1643-1647.

22.A new township of Bandar Baru Selayang, a new district centre for Gombak District, Selangor is now being built not very far from the hill. Gombak Industrial Estate and new sub-urban housing estates such as Taman Sri Gombak, Taman Koperasi Polis, Taman Selasih, Taman Desa Minang, Taman Greenwood, Taman Gombak, and Taman Melewar are built within the immediate vicinity of the caves since late 1970s. Other housing schemes are contemplated. Since their discovery in the early 1900s, the main caves have been occupied by Hindu Temples. The temples attract tens of thousand devotees during the Festival of Thaipusam every year. Smaller caves that have recently been discovered are about to suffer similar fate. Incidently the bats survived years of stone quarrying activities near-by. The quarrying activity was stopped in mid-1980s not because of the danger it posed to the bats or the nearby inhabitants but to the temples within the caves.

23.Several small systems already exist in the country, for example in the local universities (see also Chapter 4).

24."Top-bottom" planning is when planning activities are driven from the higher level of government or hierarchy normally by the setting up of national objectives. It is around these national objectives that regional and local objectives and planning activities are derived and conducted. This type of planning is very popular where the central government is very strong. The reverse is of course, "bottom-up" planning where planning objectives and activities are very much determined by the local needs. This type of planning is also known as "contingency planning".

25.Manheim, M.L. (1987), The Third Computer Revolution: Implication for Training in Developing Countries, in **Regional Development Dialogue**, Vol.8, No.1, pp. 122-138

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1. Aronoff, S. (1989), **Geographic Information System: A Management Perspective**, WDL Publications, Ottowa, 294 pages.

Aronoff discusses the background, principles and concepts of Geographic Information Systems (GIS) in a most easily understood way even for the novice in the subject. The book discusses the potential and capability of the system in helping environmental planners in their daily tasks such as land use planning and resource inventory. Despite its simplicity the book contents a very thorough presentation of the connection between the system and remote sensing data, especially the satelliate-based data. Although a bit scant on urban applications, the book is a good reference for rural applications.

2. Beard, M.K., N.R.Chrisman, and T.D. Patterson (1984), Integrating Data for Local Resource Planning: A Case Study of Sand and Gravel Resources, in **Urban and Regional Information Systems Association**, pp. 87 - 98.

When one is working within a strategic planning framework, for example, the structure planning system, one is bound by statutory requirements. These may be in the form of zoning regulations, political, administrative, or ownership boundaries. Another type of encumbrance is the existing physical uses of the land, for example, housing, industrial or other structures. These are the realities of urban planning that environmental resources assessment models concerned with tracts of rural and underdeveloped land may overlook.

3. Belknap, R.K. and J.G. Furtado (1967), **Three Approaches to Environmental Resource Analysis**, Graduate School of Design, Harvard University. 102 pages.

Major credit in pioneering the trend that set about to systematically and scientifically assessing the landscape resources of an area under consideration should go to three men: Angus Hills (1966), Philip Lewis (1966) and Ian McHarg (1969). The main objectives of the book are to examine how these three individuals identified, analysed and evaluated the natural and man-made resources that made up the physical environment and outline their procedures.

G. Angus Hill (1966), a senior soil scientist with the Forestry Commission of Canada, developed an analysis technique to assess Use Capability, Use Suitability and Use Feasibility of a site. Eventhough there were a lot criticisms about the validity of some of the underlying assumptions made by Hills in producing the so-called Hills System of Land Classification for Potential Use and Management, his method was undoubtedly the first assessment technique that "attempted" to scientifically analyse the ecological and soil capability to support particular activities in a particular site.

Philip H. Lewis' contribution to landscape resource assessment was the recognition of socio-cultural input in shaping the landscape and landscape resources. In the process, he developed an analysis technique that identified and made an inventory of the intrinsic and extrinsic resources of a region. Working on this inventory, he identified flood plain patterns and predicted damage to an urban area should floods occured within it. He came up with what he termed as "environmental corridors". He believed that the identification of these environmental corridors would help the planners formulate development strategies that would preserve socio-cultural identity of the locality in question. Lewis believed strongly in the need for cultural continuity in any development. Because of that he also identified areas with varying degree of cultural impact on the landscape. He called these areas "cultural corridors". He believed that by recognizing the interplay of factors that produced these corridors, a planner would be better placed to guide the development of such areas not only without losing but actually emphasizing the meanings of their landscape resources to the people involved with them. This, according to Lewis would ensure contextual reference to the place.

Ian L. McHarg developed a technique of resource assessment that he claimed was based on the understanding of nature. He expoused the philosophy of "ecological determinism". Based on the so-called "concept of causality", McHarg collected data based on a system of 8 decending categories: climate, geology, physiography, hydrology, pedology (soil), plant associations, animals (wildlife) and land use. He profoundly believed in the need to understand the process of nature in designing. He emphasizes "that nature response to laws, representing values and opportunities for human use with certain limitations and even prohibitions".

The book made several conclusions on the techniques developed by the three pioneers above: firstly, the approaches had been structured primarily as a method to supplement the planning process; secondly the three approaches were essentially systems for classifying land and associated resources according to certain physical characteristics; thirdly their potential usefulness as coherent systems could be misleading as they were difficult to integrate into total planning process because they tended to leave to the larger process (i.e. the planning process) the problems of economic and social evaluation, which were often considered central to the problem of resource planning.

4. Burrough, P. (1980), **Principles of Geographical Information Systems for Land Resources Assessment**, Clarendon Press, London, 194 pages.

The book discusses in great detail the principles of Geographic Information Systems (GIS). The presentation of the concepts of databases and data models is an excellent reference to the understanding of the various systems that currently exist in the market. Being strongly database-bias, Burrough discusses thoroughly the applications of the systems in making land resource inventories such as soil and ecology. The book also discusses at great length the criteria of selecting an appropriate Geographic Information System (GIS) so that the maximum use can be made of the system by the widest spectrum of users in an organization such as a local authority.

5. Cullen, G. (1971), (New Edition), **The Concise Townscape**, London Architectural Press, London.

The main objectives of Cullen's work were the definitions and characteristics of a "Townscape". His analysis included serial vision, place, and content. By serial vision he meant the interplay of existing view and emerging view due to the "drama" of contrast and juxtaposition. By place he meant a sense of being in a particular place because of its distinct characteristics. By content he meant the architectural style, scale, materials, and layout of a place. Cullen cited colour, texture, style, character, personality and uniqueness as the identifying elements of contents.

6. Fabos, J.G. and S.J. Caswell (1977), **Composite Landscape Assessment Procedures for Special Resources, Hazards and Development Suitability; Part II of the Metropolitan Landscape Planning Model (METLAND)**, Research Bulletin Number 637 / January, 1977, Massachusetts Agricultural Experimentation Station.

According to Fabos, a quantitative approach to landscape planning would be able to maximize the benefit derived from the improved accuracy in landscape data. J.A. Mabbutt (1968) called this approach a "parametric approach". He described the advantages of parametric approach over the previous landscape approach in that it "achieves a more precise definition of land and ......avoids the subjectivity of a landscape method (or approach); being quantitative, it allows comparison between and affords greater consistency within land evaluation projects; and it is in terms suited to automatic scanners and computers".

Using the principles of parametric method, Fabos, J.G. et al. developed the Metropolitan Landscape Planning Model (METLAND) in 1971. METLAND was developed in response to the hypothesis that the "metropolitanization" of eastern Massachusetts was causing a needlessly high depletion of its environmental resources. Fabos defined "metropolitanization" as the process of gradual conversion of rural land to urban uses. It was further hypothesized that one of the prime reasons for this fact was a failure to take environmental resources (meaning landscape resources) into account in the decision-making during the planning process. It was argued that if these landscape resources could be quantified, a first step would be taken to put them on equal footing with other quantified "values" (such as economic and social values) and thereby integrating them into the decision-making process during the relevant urban planning stages.

7. Johnston, K.M. (1987), Natural Resource Modelling in the Geographic Information System Environment, in **Photogrammetric Engineering and Remote Sensing**, Vol. 53, No.10

Johnston, K.M. (1987) addressed the problems of managing a situation where multiple suitablities exist. The purpose of the main model was to provide land use management with the flexibility to test a variety of management scenarios and objectives and to provide an opportunity to examine how the results might vary. A built-in system of evaluation, which would indicate the influence of each scenerio or objective on a site, aided managers in selecting the scenerios that would best meet their needs, and in determining scenarios that should be explored further.

8. Lee Williams, T.H. (1987), Implementing LESA on a Geographic Information System - A Case Study, in **Photogrammetric Engineering and Remote Sensing**, Vol. 51, No.12

T.H. Lee Williams (1985) developed for USDA Soil Conservation Service the agricultural Land Evaluation and Site Assessment (LESA). This not only determined the quality of land for agricultural use (SA factor) but also assessed its economic viability (LE factor). The result of the two analyses would give a LESA ratio, that would allow a rational, consistent, and sound basis for making land use decisions. Eventhough LESA was developed as an agricultural model there was no doubt that it could be adapted for use in urban landscape planning. However, the fact remains that it was very much a single objective model. There was still a need to find ways of solving the conflict that would arise when incidences of multiple suitabilities were detected for one or more areas under scrutiny.

9. Lyle, J. and F.D. Stutz (1983), Computerized Land Suitability Mapping, in **The Cartographic Journal**, Vol.20, No.1

Earlier work in Geographical Information System (GIS) analysis tended to be single objective or linear. The one positive contribution of Lyle and Stutz's model was that it managed to incorporate a close connection between suitability mapping and environmental impact prediction and at the same time to cast both in a larger perspective. It used the term "effects" rather than "impacts" because the later carried a negative bias, a subtle implication that "effects" were necessarily adverse. The term "developmental actions" were prefered to "land use" because it is useful to know the specific activities that act on the land to bring about particular effects.

10. Lynch, K. (1960), **The Image of the City**, M.I.T. Press, Cambridge, Massachusetts.

Lynch's methodology of defining image of a city was laid out in his book **"The Image of the City"**. The analysis of a city image consisted of lenghty interviews with individuals, beginning with open ended questions such as "What first comes to your mind when you think of Boston (or wherever)?" and "Please draw me a map of Boston". It then went on to ask the person to describe how he or she would walk or drive from some given location to another, and what they would see along the way. Further they would be asked to name the "most distinctive" elements of the city in question, and described a few of these in detail. The interviewees might also be asked whether they recognised places in a set of photographs and say how they were able to make the identification. As a conclusion of this process, Lynch said that the image of a city was made up of five elements: paths, edges, districts, nodes and landmarks.

11. McHarg, I.L. (1969), **Design With Nature**, Doubleday / The Natural History Press, 197 pages.

The book is at once a ringing indictment of western civilization's anthropocentric attitude toward nature which is reflected in its blighted cities and its polluted environment, and an exploration of a more scientifically founded relationship between man and nature. It is a demonstration of rational planning process based upon the natural sciences. It is clear from the book, that McHarg's intense interest in life processes and in presenting them as limiting and liberating criteria and his training as a landscape architect as well as a regional planner probably has a major influence on his philosophy and subsequently on his analysis method. The whole thrust of this work seemed to be a return to the urban planning philosophy popularised

by his more famous countryman, Patrick Geddes a few decades earlier.

12. Steiner, F. (1991), **The Living Landscape: An Ecological Approach to Landscape Planning**, McGraw-Hill, Inc., New York, 356 pages.

Building on the works of McHarg (1969), Steiner developed a landscape planning model in which he tried to put more emphasis on the establishment of goals, implementation, administration, and public participation, yet did so in an ecological manner. This differed from McHarg's model which emphasized on inventory, analysis and sysnthesis. However, although, he came up with what he termed as an "Ecological Planning Model", his work is not much more than a collection of landscape assessment methods that had already been developed such as McHarg's Model, Soil Conservation Service Systems, the Carrying-Capacity Concept, Dutch Suitability Analysis. Some of these were listed on page iv. To his credit, Steiner attempted to incorporate Geographic Information Systems (GIS) concepts. However, it is obivious that he was not a keen proponent of such computer-based systems as he only briefly discussed the technology in one isolated application, namely, the Dane County Land Records Project (p.150).

13. Stenitz, C. et al. (1970), Landscape Resource Analysis: The State of the Art, in **Landscape Architecture**, January.

In 1969, Steinitz, C. et al. carried out a systematic examination of these early studies in landscape resource assessment and analysis, including the work of Hills, Lewis and McHarg. They concluded that much good work was then in progress, but they were poorly documented and followed up. By extracting the rationales and procedures from these studies, Steinitz et al. were able to put these methods to test on a common site. As the result of this examination, they have categorized the work, according to increasing complexity.

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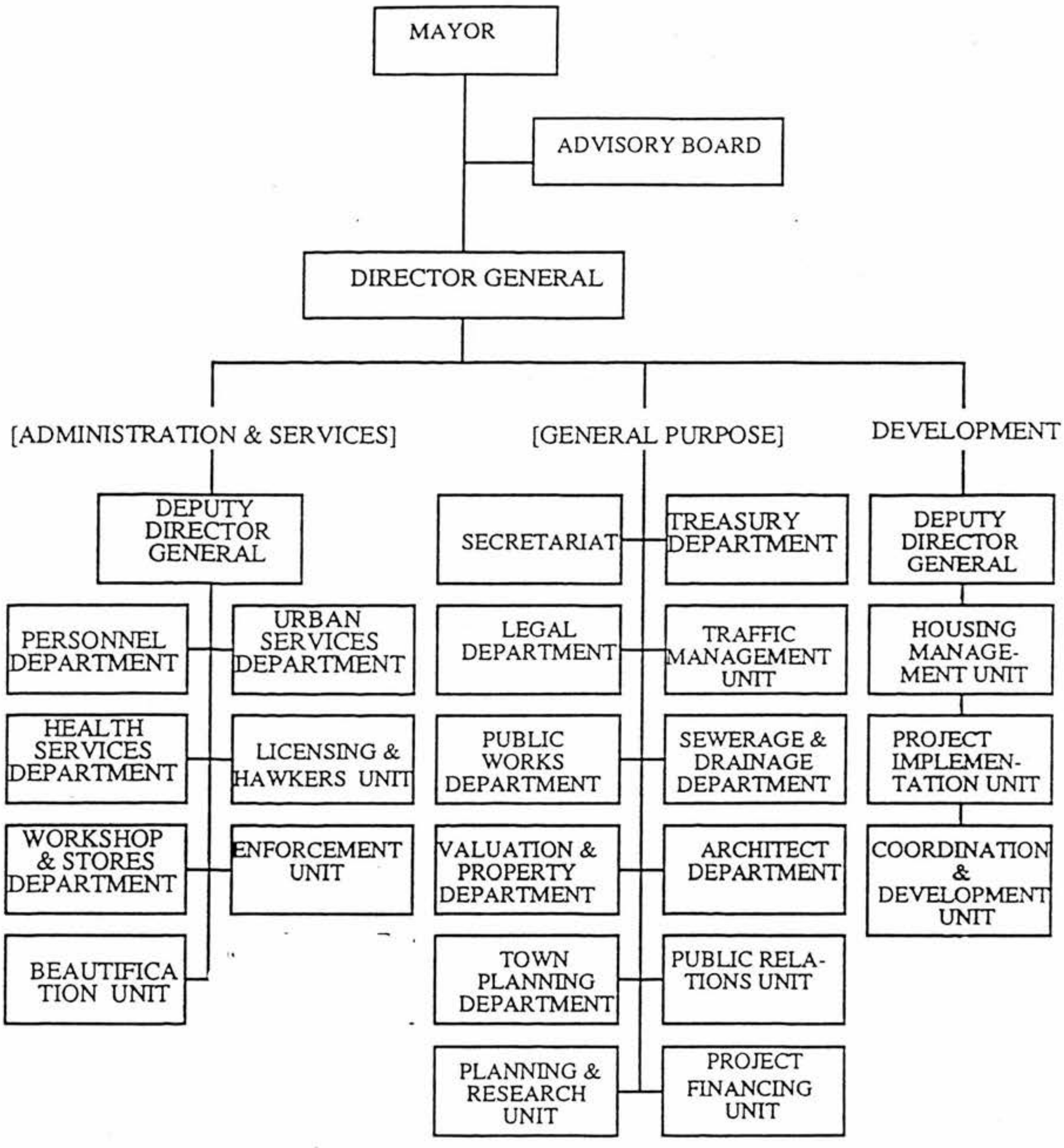


APPENDIX 1: ADMINISTRATIVE ORGANIZATION OF THE CITY HALL OF KUALA LUMPUR
(Source: DBKL, 1991)

APPENDIX 2: PERCEPTION SURVEY ON URBAN LANDSCAPE RESOURCES OF KUALA LUMPUR OLD TOWN

PART 1: RESPONDENT'S PERSONAL PARTICULARS
BAHAGIAN 1: MAKLUMAT PERIBADI RESPONDEN

Check ( ) the most accurate answers.
Tanda ( ) jawapan yang paling tepat

1. AGE (in years) *UMUR (dalam tahun)*			
<18	18-35	36-55	>55

2. SEX *JENTINA*	
M/L	F/P

3. ETHNIC GROUP *BANGSA*			
Malay *Melayu*	Chinese *Cina*	Indian *India*	[illegible]

4. EDUCATION *PENDIDIKAN*	
Primary *Rendah*	
Secondary *Menengah*	
College *Kolej*	
University *Universiti*	

5. OCCUPATION *PEKERJAAN*	
Manual *Buruh*	
Para-profesional *Separa-profesional*	
Profesional / Management *Profesional / Pengurusan*	
Higher Management *Pengurusan Tinggi*	

6. YRS. OF RESIDENCE *THN. MASTAUTIN*	
<5	
5-10	
11-20	
21-30	
30-50	
>50	

7. PLACE OF RESIDENCE *TEMPAT TINGGAL*	
Within the old town *Dlm. kawasan bandar lama*	
Within the City Centre but outside the old town *Dalam Pusat Bandar tetapi diluar bandar lama*	
Other parts of Kuala Lumpur *Lain-lain bahagian Kuala Lumpur*	
Fringe of Kuala Lumpur *Pinggiran Kuala Lumpur*	

8. FAMILY'S ORIGIN *ASAL KELUARGA*	
Kuala Lumpur *Kuala Lumpur*	
Kelang Valley *Lembah Kelang*	
Outside Kelang Valley *Luar Lembah Kelang* West Coast (*P. Barat*)	
East Coast (*P. Timur*)	

PART 2: GENERAL PERCEPTION ON URBAN ENVIRONMENT
BAHAGIAN 2: PERSEPSI UMUM MENGENAI ALAM SEKITAR BANDAR

9. In relation to environment, in which category would you categorise yourself? *Dalam hubungan dengan alam sekitar, dalam kategori mana anda letakkan anda sendiri?*	
Nature-lovers *Pencinta alam*	
Concern about environment *Peka tentang alam sekitar*	
Neutral *Neutral*	
Unconcern about environment *Bersahaja tentang alam sekitar*	

10. If the answer to Question 9 had been either the first or the second, how did you acquire the love or the concern for environment?
Sekiranya jawapan kepada Soalan 9 adalah samada yang pertama atau kedua, bagai-manakah anda mendapat kecintaan atau kepekaan pada alam sekitar?

It came naturally *Secara semulajadi*	
Trips into nature outside the city *Perjalanan ke alam semulajadi di luar bandar*	
Trips to family's original village *Lawatan ke kampong asal keluarga*	
Environmental education in school *Pendidikan alam sekitar di sekolah*	
Exposure from mass media *Pendedahan oleh media massa*	
Religious education *Pendidikan ugama*	
Others (mention) *Lain-lain (Nyatakan)*	

11. What do you think should be done with Bukit Nenas Forest Reserve?
Pada pendapat anda, apakah patut dibuat dengan Hutan Simpanan Bukit Nenas?

To be conserved *Dikekalkan*	
To be developed into tourist attraction *Dibangunkan untuk tarikan pelancung*	
To be developed just as other urban area *Dibangunkan seperti kawasan-kawasan bandar lain*	
To be developed as a park *Dibangunkan sebagai taman*	

12. Do you think that the Kelang - Gombak Rivers system is being managed in the best possible manner now? Why?
Adakah anda berpendapat bahawa Sungai Kelang - Gombak diurus dengan sebaiknya sekarang? Kenapa?

Yes *Ya*		
No *Tidak*		

13. Are you aware of the historical significance of Kelang - Gombak Rivers?
Adakah anda peka tentang kepentingan sejarah Sungai Kelang - Gombak?

Yes *Ya*	
No *Tidak*	

14. Do you agree with the flood mitigation solution being carried out on the Kelang - Gombak Rivers? Why? *Adakah anda bersetuju dengan penyelesaian masalah banjir yg. dilaksanakan pada Sungai Kelang - Gombak sekarang? Kenapa?*		
Yes *Ya*		
No *Tidak*		

15. Do you think we should allow natural revegetation of in-fill areas within Kuala Lumpur Old Town? Why? *Pada pendapat anda, patutkah dibiarkan pertumbuhan semula berlaku secara semulajadi pada kawasan-kawasan kosong di antara bangunan di Bandar Lama Kuala Lumpur? Kenapa?*		
Yes *Ya*		
No *Tidak*		

16. Do you think that we should conserve the surviving colonial shophouses? Why? *Pada pendapat anda, adakah patut kita kekalkan kedai-kedai kolonial lama yang ada? Kenapa?*		
Yes *Ya*		
No *Tidak*		

17. Do you have any objections to the types of development being allowed in areas with high concentration of colonial shophouses such as Kuala Lumpur Old Town? Why? *Adakah anda bersetuju dengan jenis pembangunan yang telah dibenarkan pada kawasan-kawasan di mana terdapatnya konsentrasi kedai-kedai kolonial? Kenapa?*		
Yes *Ya*		
No *Tidak*		

ANSWERS TO QUESTIONS

PART II: ENVIRONMENTAL PERCEPTION

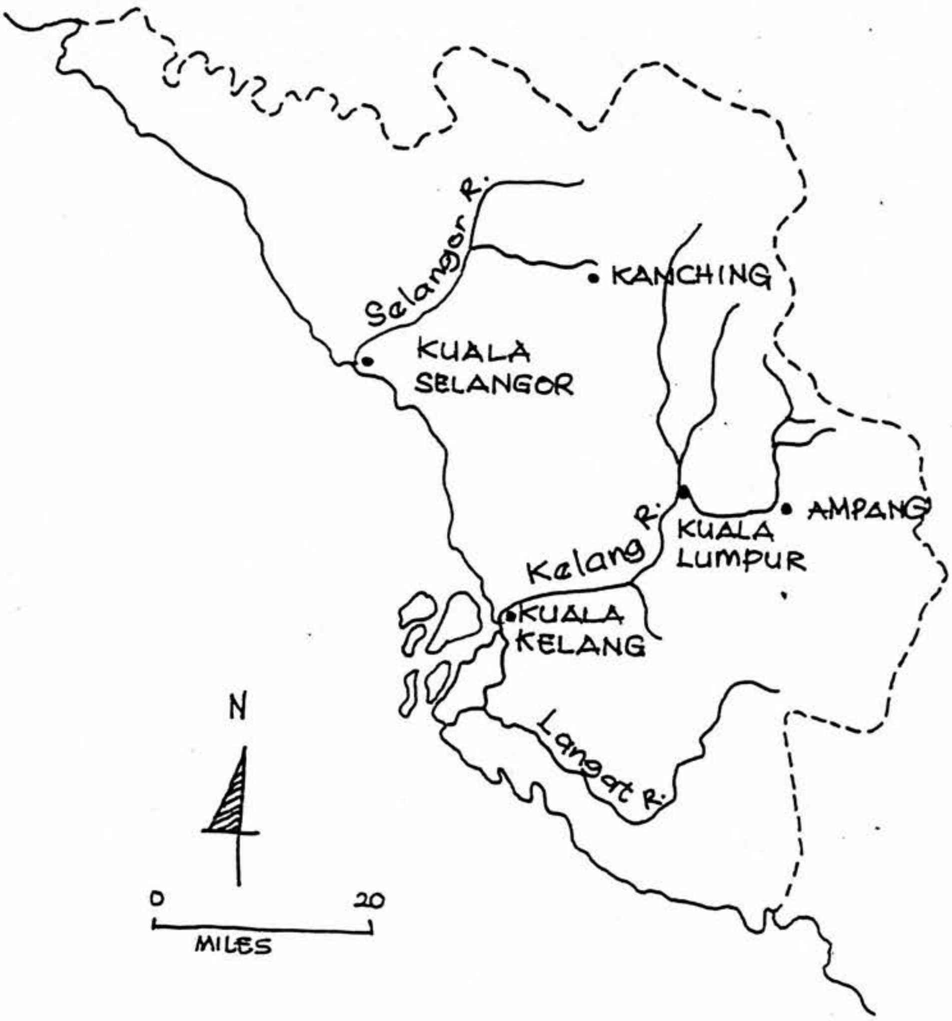
	No.	%
9. Categories		
Nature-lovers	87	34.8
Concern	102	40.8
Neutral	37	14.8
Unconcern	24	9.6
Total	250	100.0
10. Origin for love or concern about environment		
Comes naturally	32	12.8
Trips outside the city	41	16.4
Trips to family's original village	94	37.6
Education	168	67.1
Exposure from mass media	76	30.4
Religious education	32	12.8
Others	12	4.8
Total		100.0
11. The future of Bukit Nenas		
To be conserved	87	34.8
To be developed into tourist attraction	112	44.8
To be developed just as other urban area	37	14.8
To be developed as a park	98	39.2
No idea	23	9.2
No response	17	6.8
12. Best Management of Kelang - Gombak Rivers		
Positive	35	14.0
Negative	134	53.6
Neutral	76	30.4
No response	5	2.0
Total	250	100.0
Reasons for positive:		
Apparent general improvement	12	4.8
Nothing else could be done	9	3.6
Flood control is paramount	11	4.4
No reason	3	1.2
Reasons for negative:		
The apparent pollution level too high	56	22.4
Rivers generally inaccessible	21	8.4
for recreational activities	46	18.4
General unkempt outlook of the banks	6	2.4
Buildings are blocking the rivers	3	4.0
Buildings are encroaching on river reserve	1	0.4
No reason	1	0.4
13. Historical importance of Kelang - Gombak Rivers		
Positive	187	74.8

Negative	34	13.6
No idea	20	8.0
No response	9	3.6
Total	250	100.0
14. Flood mitigation solution of Kelang - Gombak		
Positive	127	50.8
Negative	67	22.8
Neutral	32	12.8
No idea	13	5.2
No response	11	4.4
Total	250	100.0
Reasons for positive:		
Need drastic solution	27	10.8
Cost effective	48	19.2
Exude confidence	25	10.0
Looks beautiful	8	3.2
Hunch feeling	16	6.4
No reason	3	1.2
Reasons for negative:		
Too conspicuos	2	0.8
Loss of a natural feature	10	4.0
Costly	21	8.4
Turn the river into monsoon drain	8	3.2
Loss of historical feature	19	7.6
Loss of habitat for riverside wildlife	5	2.0
Hunch feeling	1	0.4
No reason	1	0.4
15. In-fill development:		
Yes	43	17.2
No	112	44.8
No response	95	38.0
16. Conservation of surviving colonial shophouses		
Positive	96	38.4
Negative	113	45.2
Neutral	21	8.4
No idea	9	3.6
No response	11	4.4
Total	250	100.0
Reasons for positive:		
Historical importance	43	17.2
Reflect country's multi-cultural nature	17	6.8
Reflection of racial tolerance	3	1.2
Architectural importance	27	10.8
Hunch Feeling	6	2.4
Reasons for negative:		
Colonial stigma	23	9.2
Do not reflect a multi-racial culture	19	7.6

Dilapidated state	15	6.0
Uneconomic use of land	31	12.4
Do not reflect development	17	6.8
Hunch Feeling	8	3.2

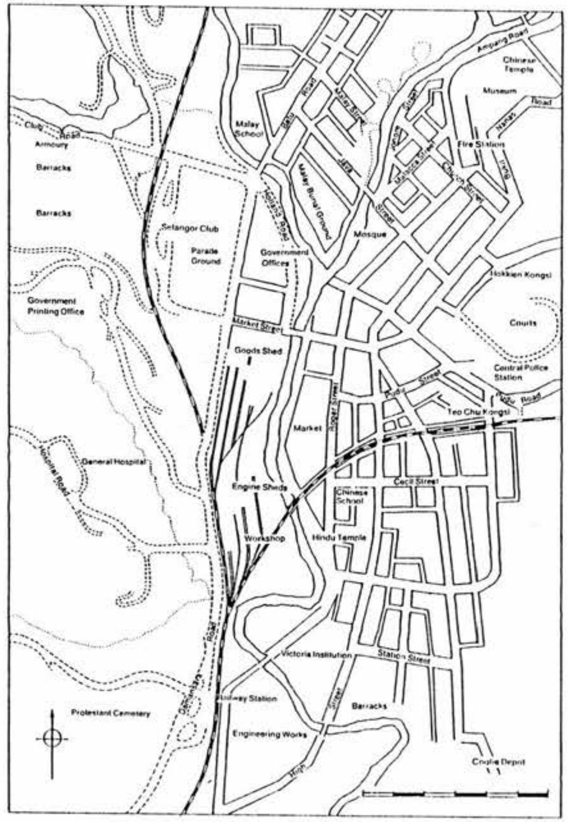
17. Any objections to current types of developments within the old town

Positive	87	34.8
Negative	118	47.2
Neutral	31	12.4
No response	14	5.6
Reasons for positive		
Change in character	34	13.6
Lost of historical assets	26	10.4
Architecturally insensitive	7	2.8
Chaotic	11	4.4
Hunch feeling	9	3.6
Reasons for negative		
Development	65	26.0
Improve image of the area	23	9.2
Economically sound	25	10.0
Hunch feeling	5	2.0

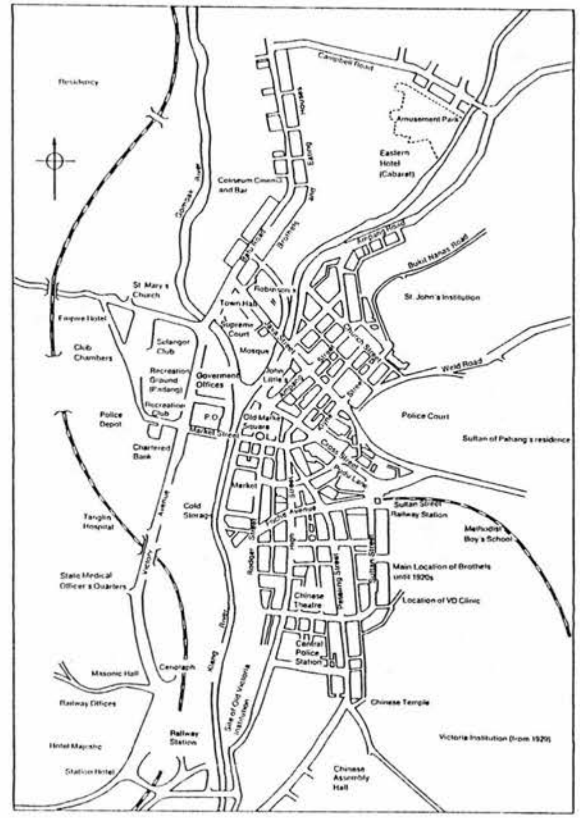


APPENDIX 3: THE STATE OF SELANGOR (PRE-1880s)
(Source: Lim, H.K., 1978)

Kuala Lumpur, 1880–95



Kuala Lumpur in the 1930s



APPENDIX 4: DEVELOPMENT OF KUALA LUMPUR OLD TOWN
(Source: Tate, M.D.J., 1987)

APPENDIX 5

THE COLONIAL SHOPHOUSE ARCHITECTURE

It is the shophouses that give the distinctive character to the urban image and morphology of Kuala Lumpur and the other colonial towns in the Peninsula Malaysia. It is only fair that we give a little more space to discuss the details of these buildings inorder to highlight the role they play in creating the unique urban character that prevails now. Following the classification systems adopted by the Singapore Urban Renewal Authority (URA, 1988) and Rahman, A. (1990), the shophouses in Kuala Lumpur may be classified by types into four categories.[1] These categories were very much evolutionary and temporal in nature.

Early Shophouse Style (Fig. A5.1)

Sometime called the Utilitarian Style, the shophouses in this category were the earliest that were built after the demolition of the wooden and thatched buildings. They typically featured one or at the most two windows on the upper floor. The buildings are 2 storeys with relatively low and squat elevational proportions. Doors and windows are of timber throughout. Most of these buildings do not have transoms. However, where they do occur, they are either rectangular or semi-circular. Other openings on the front facade include rectangular or small circular vents placed either above the door or the window openings or between them. These vents were usually unfilled, but when big enough, would be lined with wire-mesh.

The alternative name of this style bears to the fact that these shophouses are barely ornamented. What appears as string courses and cornices bear a certain heaviness in their execution. Sometimes classical ornamentation would be used. The Tuscan and Doric orders seemed to be the favourites. The prominent use of ethnic-based ornamentation also characterised these shophouses. The ethnic-based robust and vulgate ornamentation reflected the non-permanent nature of the early immigrants who mostly aspired to go back to their own country once they have made their fortunes. For others they were the expression of the yearning to be with families that were left behind because of the official ban on non-male immigration.

First Transitional Shophouse Style (Fig. A5.2)

The first difference one notices about this style when compared to its predecessor is the common occurrence of the additional third storey. The preference of the builders for more vertical proportions gave rise to buildings which gave the general feeling of lightness compared to those of the earlier style. The solid-to-void ratio of the elevational composition approaches 1:1. The openings remain predominantly timber-framed and shuttered although the use of glass in small panes on the shutters becomes increasing common. With few exceptions, this style has elevation which feature three windows on the upper storeys.

Other building vocabulary that were added to this style were the three-centre and segmental transom windows. These were infilled with glass or cast-iron or worked timber panels. Vents were employed with elegant simplicity in the architectural composition as squares or diamonds between windows. As in the earlier style, this style employed a relatively restrained ornamentation. The use of modified Corinthian or Composite Orders is common. This is in tandem with cornices and upturned string courses, thus binding the overall expression into a complete whole. The simplicity of the architecture gives this style the aura of masculinity about it.

Late Shophouse Style (Fig. A5.3)
Not only because of the relative age, but also because of its most spectacular and exuberant ornamentation, this type of shophouses is perhaps best known of all the styles. The most common facade arrangement is the the tripartite arrangement of the upper floor. The actual wall space is reduced to a minimum with three elevational windows on the upper floor. In the later examples, the "wall" surface is replaced by columns or pilasters framing the windows. Thus when the windows are opened, the facade "wall" effectively disappears and maximum ventilation is achieved.

The almost total absence of wall space did not in any way diminish or restrict ornamentation. On the contrary, ornamentation continued unrestrained and became more eclectic. In fact we have inherited the most flamboyant shophouses from the later phases of the style. Shophouses were densely covered with plaster and tile ornamentation that seemed to make the whole surface alive with movement.

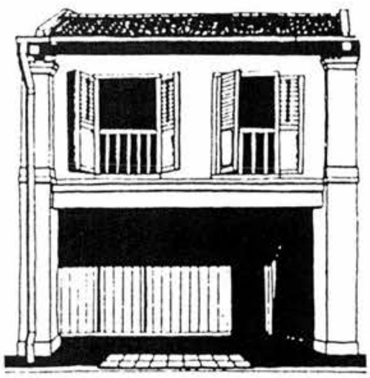
The Corinthian and Composite Orders, being the most ornamental, were obviously favoured by the owners, builders and their colonial overlords. Multi-coloured ceramic tiles and features like string courses, dentils, bouquets, pendants, festoons, plaques, name and year plates, bas reliefs and arabeques, formed in plaster, are commonly used. In most instances, these were combined with Malay timber fretwork fascia boards and balustrades, Chinese panel frescos and glazed ceramic breeze blocks harmoniously attesting the considerable artistry and sophistication of the builders.

Art Deco Shophouse Style (Fig. A5.4)
The progression of ornamentation on the shophouses reached its peak during the Late Shophouse Style. The style that took over from it however made rationalization of building elements into its geometric forms the key to its characters. The Art Deco Shophouse Style concentrated on proportional beauty and elevational composition to the

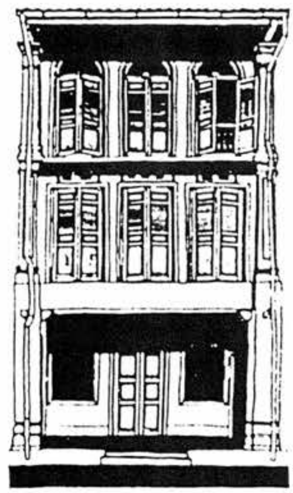
Art Deco Shophouse Style (Fig. A5.4)

The progression of ornamentation on the shophouses reached its peak during the Late Shophouse Style. The style that took over from it however made rationalization of building elements into its geometric forms the key to its characters. The Art Deco Shophouse Style concentrated on proportional beauty and elevational composition to the whole grouping of like buildings, with special emphasis on street corners. It streamlined the classical motifs, such as the column orders, arches, keystones and pediments into simple geometric designs. Decorations were rarely used.

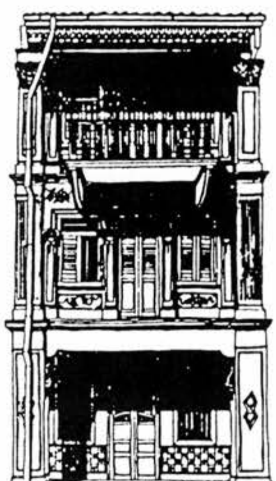
1.Urban Renewal Authority, (1988) **A Manual for Chinatown Conservation Area**, Singapore, pp.82-85. See also Rahman, A. (1990) p.51



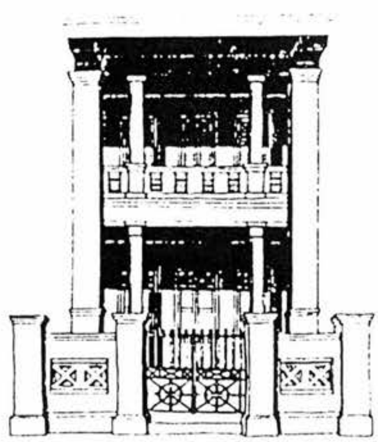
A5.1 Early Shophouse Style



A5.2 First Transitional Shophouse Style



A5.3 Late Shophouse Style



A5.4 Art Deco Shophouse Style

COLONIAL SHOPHOUSE STYLES

(URA, 1988)

★★ TUESDAY, JUNE 8, 1993 • Peninsular Malaysia 60 sen • Sarawak 70 sen • Sabah 80 sen PP 413

Flash floods cause massive traffic jams, evacuation of residents

Havoc in Klang Valley

KUALA LUMPUR, Mon. — Hundreds of thousands of commuters were caught in massive traffic jams in the Klang Valley after a four-hour downpour submerged roads and knocked out traffic lights.

The rain might have brought relief to city residents, especially after the long hot spell, but commuters suffered grief as they reached their offices between two and four hours late.

Attendance at some offices, particularly Government departments, was low.

Hundreds of workers such as those in the Tabung Haji and Perkim buildings in Jalan Ipoh were turned away after the basements of their buildings were in three metres of water.

They were only allowed into the buildings about noon after the authorities found it was safe.

Functions, including those attended by Ministers and Deputy Ministers, were also held up. Among them was the launching of a fire-prevention campaign by Housing and Local Government Minister Datuk Dr Ting Chew Peh.

However, no fatalities were reported.

Residents in low-lying areas were also rudely awakened by water rushing into their homes as rivers overflowed their banks.

The Klang River burst its banks after water rose to six metres, the first time in 15 years.

The rain began at 1am, with the downpour giving way to a slight drizzle only four hours later. The skies became clear about noon.

Traffic policemen were deployed as early as 6am at all junctions in anticipation of breakdowns. Minor accidents were reported, but there were no injuries.

Landslides were also reported in several parts of the Klang Valley. One unidentified child was injured when a landslide hit a house in Pusat Kemas in Jalan Syed Putra about 6.40am.

He was taken to the General Hospital here and given outpatient treatment.

Landslides were also reported in Jalan Jelutong and Jalan Beruas in Bukit Damansara, Jalan Kinabalu near Jalan Kuching, and Kampong Sentosa in Jalan Klang Lama.

Four cars parked in the shed of a private firm in Bandar Baru Selayang were badly damaged by a landslide about noon.

A spokesman for the Jalan Bandar traffic police operations room said the **traffic crawl was caused by the heavy rain forcing motorists to drive slowly.**

He said a few traffic lights were put out of action, adding that motorists compounded the problem when they jumped the queue. Worsening the situation were cars which stalled due to the submerged roads.

"As it was raining heavily and the roads were choked, there was no way they could repair their vehicles. Some were forced to abandon them."

Among the worst-hit roads were Jalan Bangsar, Jalan Pantai, Jalan Ipoh, Jalan Sentul, Jalan Duta, Jalan Mahameru, Jalan Pahang, Jalan Tun Razak, Jalan Kelang Lama and Jalan Kuching.

Several roads were closed to traffic from 6am. They included Jalan Bangsar (near the Jalan Travers police station), Jalan Cheras, Jalan Tun Sambanthan and Jalan Klang Lama between the fourth and eighth kilometre points. Traffic returned to normal about 11am.

An aerial view of the flooded homes in Pantai Dalam after the Sungai Klang overflowed its banks.

The Klang New Valley Expressway at 9.5km was partially closed to traffic heading to Kuala Lumpur. About a kilometre of the stretch was flooded.

City Hall said about 4,172 people were evacuated to safer ground after flash floods hit nine areas in the city between 1am and 8am.

Among the badly affected areas were Kampung Simpang Batu and Kampung Kolam Air in Sentul; Kampung Limau and Kampung Selamat in Pantai Dalam; Kampung Pasir Lama, Kampung Pasir Baru, Kampung Sentosa and Kampung Bakri in Jalan Klang Lama; as well as Kampung Jaya Murni, Kampung Benggali and Kampung Kuala Sungai Baru in Puchong.

☐ PLEASE TURN TO PAGE 2, COL 1

Concern over massive soil erosion and flash floods

Controlling land clearing

y Pang Hin Yue

JALA LUMPUR, Wed. — e Government will push stricter land develop- ent regulations in the ike of massive soil erosion d flash floods caused by controlled land clearing.

Deputy Science, Technol- y and Environment Min- er Peter Chin Fah Kui d today that there was nsiderable concern over clearing of hilly terrains housing developers and gers as this had led to soil osion, siltation and sedi- ntation problems.

The extensive clearing of d for development has to flash floods. This is ther aggravated by the liscriminate dumping of bish into drains.

Chin said Monday's flash ods in the Klang Valley s a case in point.

At a Press conference to nounce the "Unity Walk 3" on Aug 8, organised by State Amateur Race lkers Association and eras district Rukun Te- igga, he said:

"Development on hilly rains must be regulated ardless of the size of the jects. Steep slopes up to a tain gradient should be t untouched."

Chin said amendments to Land Conservation Act d the Environmental Im- ct Assessment regula- ns warranted urgent at- ition and his ministry nned to push for them.

He said the amendments uld be based on the rec- imendations of the Envi- imental Law Revision mmittee.

The committee, headed by in, was set up to tighten Environmental Quality t and other relevant regu- ions.

The 320-page report has n distributed to all the te Governments and rel- nt agencies for feedback.

The committee, which nprised representatives from various Government agencies and non-governmental organisations, has proposed that hilly land development, regardless of the size of the projects, be subject to EIA requirements.

To strengthen soil conservation efforts, the report called for strict enforcement of the Land Conservation Act 1960 and stressed the need for State authorities to ensure mitigation measures were stipulated before land development projects are approved.

Chin reiterated the Department of Environment's proposal that in order to overcome soil erosion and siltation problems in property development, the sequence of construction of buildings needed to be changed.

"Turfing, surfacing and drainage must be carried out before construction work begins," he said.

Later, Minister Datuk Law Hieng Ding said the ministry has requested about RM60 million from the Cabinet to improve the country's weather forecast system. He said a more accurate forecast system was needed.

Law said the Cabinet at its weekly meeting today has directed the Drainage and Irrigation Department to undertake a study to improve the country's drainage system.

Meanwhile, at the Dewan Negara, Finance Ministry's Parliamentary Secretary Mustapa Mohamed said the Government was in the process of undertaking several flood alleviation programmes in Kuala Lumpur costing RM760 million which are expected to be completed by the year 2007.

He said the projects included the widening of Sungai Klang, Sungai Gombak and Sungai Batu.

Replying to points raised during the debate on the Supplementary Supply Bill 1993, he said the department was also building more dams and would improve the drainage system in the city.

"So far, the Government has spent RM207 million to improve the drainage and irrigation system in the city," he said.

QUIC

☐ FROM PAGE ONE

About 250 people were evacuated when flood waters rose to about a metre in Taman Bunga Melor off Jalan Kapar in Klang.

The residents blamed construction work nearby for clogging the drains and slowing down the flow of water.

Others evacuees were from the Public Works Department (JKR) quarters in Jalan San Peng; Kampung Benteng, Segambut; Jalan Chan Sow Lin, Sungai Besi; Kampung Haji Abdullah Hukum, Bangsar; and the Jalan Travers railway quarters.

Community halls, schools and *surau* were turned into relief centres to provide temporary shelter.

City Hall assistant senior directorate officer Hamzah Ahmad said most centres were closed about noon. Only 725 victims had yet to go home at 5pm.

Of this number, 294 are putting up at the Sekolah Kebangsaan Saraswathy, Kampung Sentosa; 157 at Sekolah Kebangsaan Seri Pantai, Bangsar; 61 at Sekolah Seri Angkasa, Pantai Dalam; and 30 at the Jalan Klang Lama Rukun Tetangga hall.

Hamzah said the biggest number of evacuees was from 5.6km Jalan Klang Lama. A total of 1,800 residents were moved after their homes were in 1.5 to three metres of water.

Of this number, 650 were given temporary shelter at Sekolah Rendah Jenis Kebangsaan Chong Hwa, 650 at the Jalan Thamby Pillai Rukun Tetangga hall and 500 at the Hock Aun Rukun Tetangga hall.

At Kampung Sentosa, about 700 villagers were evacuated to a *surau* after the nearby Sungai Klang overflowed. However, they went home about 2.30pm.

The other evacuations were from Kampung Haji Abdullah Hukum where 600 people were given shelter at a nearby Sang Kancil hall; 400 from Kampung Simpang Batu, Sentul; 278 from Rumah Panjang Pantai Dalam; 294 from Kampung Pasir Seri Petaling; and 100 from the Jalan Travers railway quarters.

Hamzah said about 100 City Hall men, headed by operation chief Zulkifli Ibrahim, and 150 Malaysian Red Crescent Society members helped in the evacuation. Twelve MRCS boats were used to ferry people trapped in their homes to safer grounds.

NEW STRAITS TIMES

RM15m plan to curb city floods

KUALA LUMPUR, Mon. — City Hall will spend RM15.8 million over the next three years to clean up heavily silted rivers, which is a major cause of flash floods.

Datuk Bandar Datuk Mazlan Ahmad said City Hall was expected to receive the allocation next month.

He said desilting works would be carried out along Sungai Klang, Sungai Batu and Sungai Gombak and all its tributaries.

Mazlan said the Government had in April taken the responsibility of maintaining rivers in the city away from the Drainage and Irrigation Department (DID) and handed it over to City Hall.

"This is to ease the burden on the DID which will still have responsibility for the maintenance of other rivers in the Klang Valley," he told newsmen after visiting several flood-hit areas here today.

Mazlan said City Hall would call for tenders for the projects as soon as the funds were available.

He said RM7 million would be used this year to build new retention ponds, silt and rubbish traps, cleaning the river of rubbish and for beautification purposes.

"In all, we have about 190km of river to clean," he said.

On today's flash floods, Mazlan said Sungai Klang burst its banks when the water level rose above six metres.

"Never in 15 years has the water level risen this high," he said.

He said this resulted in low-lying areas by the river to be flooded due to the backflow pressure of water rushing out of the river.

The situation was aggravated by the heavy rain upstream and large amounts of water run-off from the road surface.

Mazlan said the public were also to blame for dumping rubbish into drains and river as this cause blockages.

"We have done our duty to provide ample bins and systematic rubbish collection.

APPENDIX 7

GEOGRAPHIC INFORMATION SYSTEM (GIS): DATA MODELS AND ANALYSIS FUNCTIONS

SPATIAL DATA MODELS

There are two ways of representing the spatial component of a geographic information: the vector model and the raster model (Fig. A7.1). In the vector model, objects are represented by points, lines and polygons as on the maps. The position of each object is defined by its placement in a map space that is organized by a coordinate reference system. Every position has a unique coordinate value. The spatial entities in the vector model correspond more or less to the a vector representation (C). The forest stands (P) and (S) are area features. The river (R) is spatial entities that they represent in the real world.

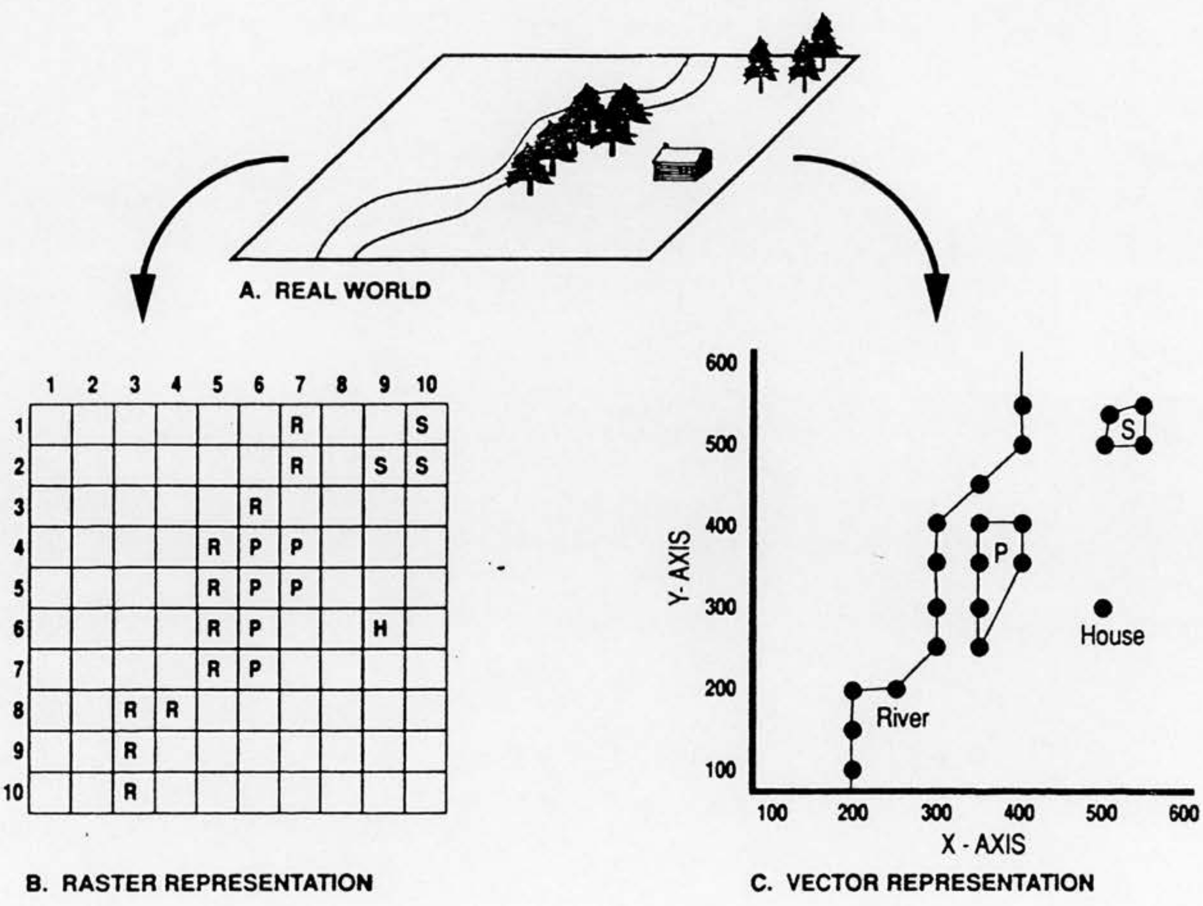


Fig. A7.1: Comparison of Raster and Vector Models. The Landscape in A is shown in a raster representation (B) and a line feature, and the house (H) is a point feature (Aronoff, 1989, p.164).

In the raster model, the space is regularly subdivided into cells (usually square in shape). The location of a geographic object is defined by the row and column position of the cell it occupies. The area that each cell represent defines the spatial resolution available. Unlike those of the vector model, the units of raster model do not correspond to the spatial entities they represent in the real world. The spatial entities or units of the raster data model are not the objects we conceptualize; they are the individual cell.

Aronoff (1989) summarizes the advantages and disadvantages of the raster and vector model in Table A7.1. below:

RASTER MODEL	VECTOR MODEL
Advantages:	**Advantages:**
1. It is a simple data structure. 2. Overlay operations are easily and efficiently implemented. 3. High spatial variability is efficiently represented in a raster format. 4. The raster format is more or less required for efficient manipulation and enhancement of digital images.	1. It provides a more compact data structure than the raster model. 2. It provides efficient encoding of topology, and, as a result, more efficient implementation of operations that require topological information, such as network analysis. 3. The vector model is better suited to supporting graphics that closely approximate hand-drawn maps.
Disadvantages:	**Disadvantages:**
1. The raster data structure is less compact. Data compression techniques can often overcome this problem. 2. Topological relationships are more difficult to represent. 3. The output of graphics is less aesthetically pleasing because boundaries tend to have a blocky appearance rather than the smooth lines of hand-drawn maps. This can be overcome by using a very large number of cells, but may result in unacceptably large files.	1. It is a more complex data structure than a simple raster. 2. Overlay operations are more difficult to implement. 3. The representation of high spatial variability is inefficient. 4. Manipulation and enhancement of digital images cannot be effectively done in the vector domain.

Table A7.1: Comparison of Raster and Vector Data Model (Aronoff, 1989, p.166).

GEOGRAPHIC INFORMATION SYSTEMS (GIS) ANALYSIS FUNCTIONS

Fig. A7.2 summarises a classification of GIS analysis functions. The most important group of functions for this study is the Integrated Analysis of Spatial and Attribute Data. It is this ability to analyse together spatial and attribute data that most distinguishes a GIS from automated mappings and computer-aided drafting systems. This group of functions can be divided into four categories: retrieval / classification / measurement, overlay, neighbourhood, and connectivity or network analysis:

RETRIEVAL operations on spatial and attribute data involve selective search, manipulation, and output of data without the need to modify the geographic location of features or to create new spatial entities. Example of these may be the production of a map showing buildings by ages, or conditions, or types. A manipulative process may involve asking for buildings of a certain age group only. Thus one can actually see what is happening during certain particular period of interest. In the case of the study area, one may for example be interested in the extent of the built-up area during the period prior to the Second World War when the country was still under the protectorate status.

A **GENERALIZATION** or map-dissolve operation can be used to make a classification less detailed by combining classes. It is often used to reduce the level of classification detail to make an underlying pattern more apparent. For example, in land use classification, all land considered as "commercial" can be regrouped under one category rather than the various sub-categories of retail, wholesale, and service. The same could be done in other use-types, for example residential, institution or government, and transportation. In this way a more discernable land use pattern will emerge. Fig. A7.3 shows an operation with the aim of emphasing the boundary between urban and rural area.

CLASSIFICATION operations can be used to regroup entities to suit the need of a particular analysis. For example, open spaces can be classified under various classifications: nature reserve, river reserve, small urban open space, road verge and median. One can also request a print-out to show areas with natural or semi-natural management regime or improved areas. Or in the case of soil analysis, one classification can involve dividing the soil according to types, or degree of disturbance. A classification operation can involve regrouping the soil according to particular reclamation actions.

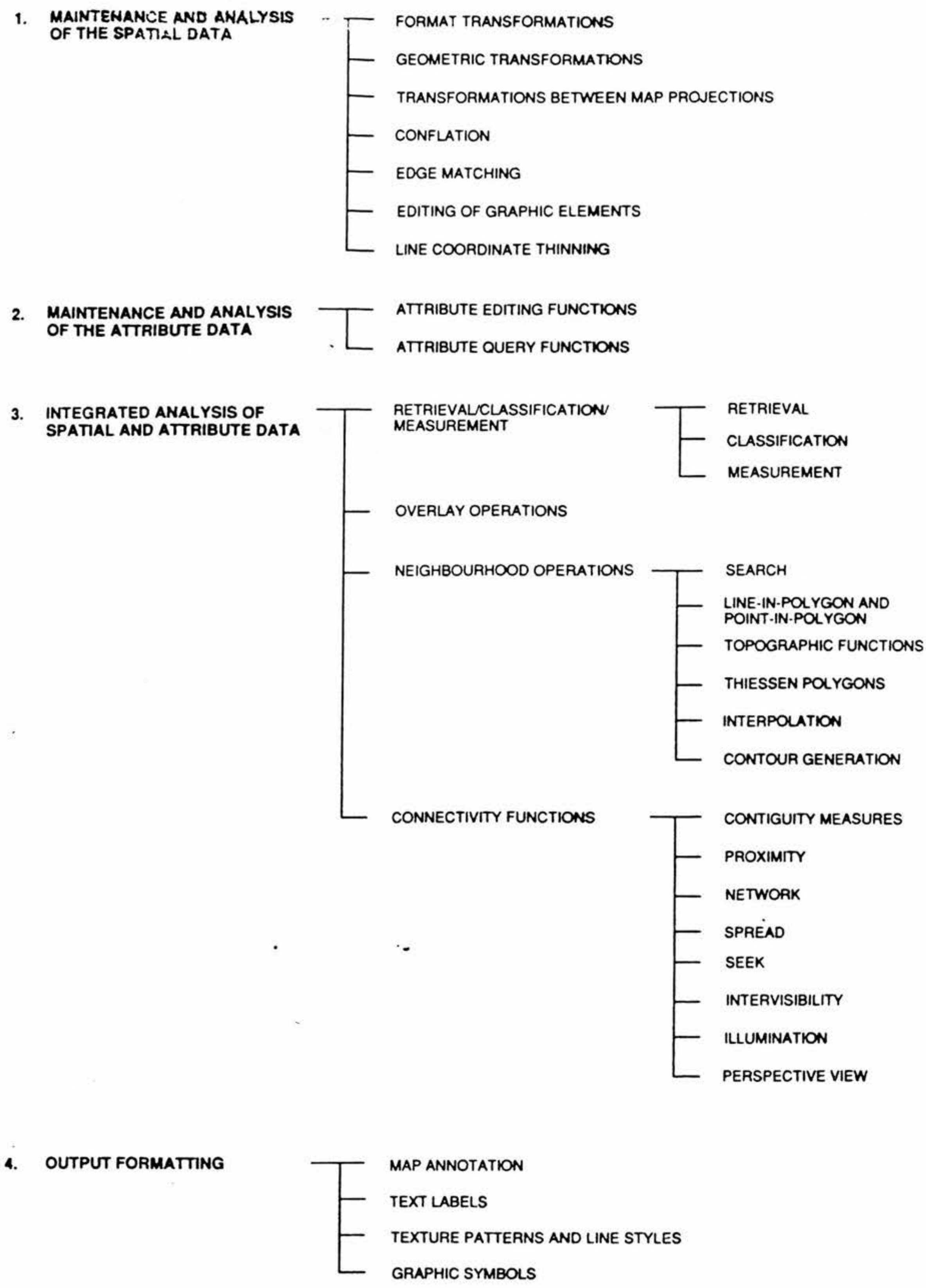


Fig. A7.2: A Classification of GIS Analysis Functions (Aronoff, 1989, p. 196)

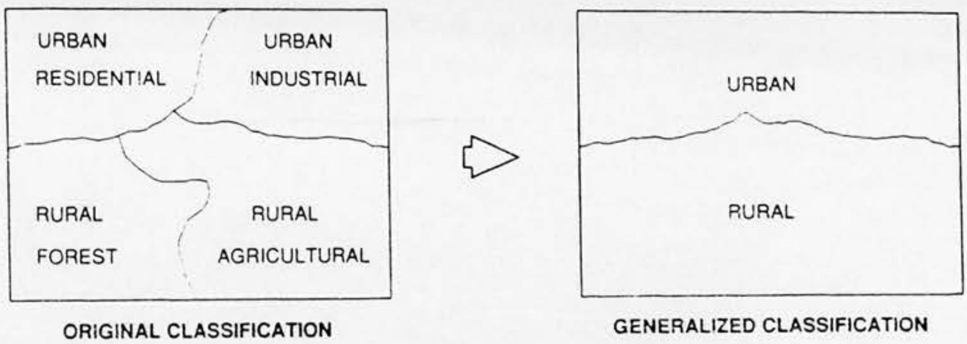
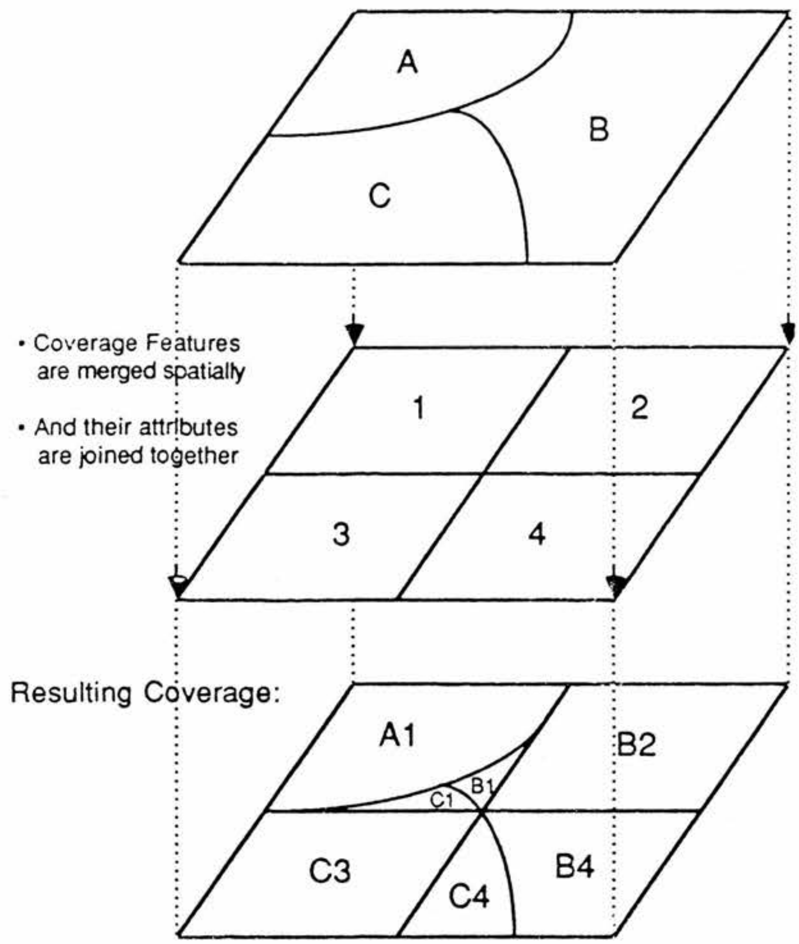


Fig. A7.3: A Generalization operation. The operation combines the land use classes to reduce the level of classification detail. This produces a clearer definition of boundary between urban and rural area (Aronoff, p.208).

An **OVERLAY** operation may involve logical or arithmetic overlay operations. A logical overlay involves finding those areas where a specified set of conditions occur (or do not occur) together (Fig. A7.4). For example, an area suitable for the siting of urban waste disposal may be defined as an area of a certain distance from a populated area, certain depth to water table, not within an acquifer, and having a natural screen from the public. A logical overlay operation can be used to determine areas of graded suitability for such use. The flexibility provided to the operator and level of performance of overlay operations vary widely among Geographic Information Systems (GIS).
Arithmetic overlay, on the other hand, includes such operations as addition, subtraction, division, and multiplication of each value in a data layer by the value in the corresponding location in a second data layer (Fig. A7.5).

Topological overlay New map features can be created by overlaying features from two map layers. Features for each layer are intersected to create new output features. Attributes for each input feature are combined from the two layers to describe each new output feature. For example:

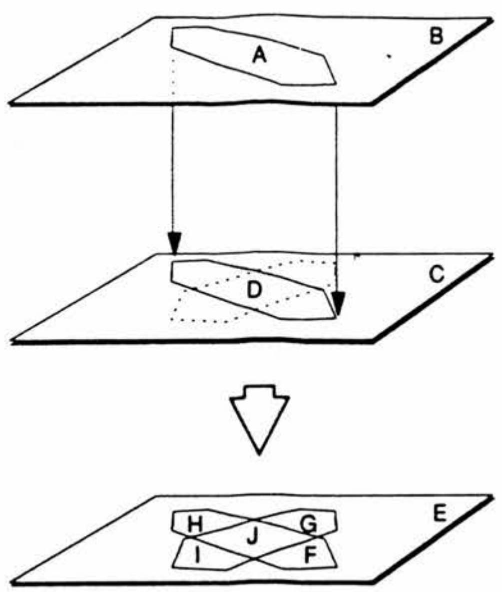
Conceptual View of Map Overlay



Topological overlay produces a spatial join of the input feature attributes. Notice how the output polygons in the figure above have attributes from both input layers. Topological overlay not only creates new spatial features – it creates new attribute relationships. The overlay operation merges attributes from the input features.

Fig. A7.4: A Conceptual View of An Overlay Operation (ESRI, Redlands, California, 1987, p.3-18)

SPATIAL DATA



ATTRIBUTE DATA

INPUT
DATA LAYER A

POLYGON	VALUE
A	1
B	2

INPUT
DATA LAYER B

POLYGON	VALUE
C	5
D	10

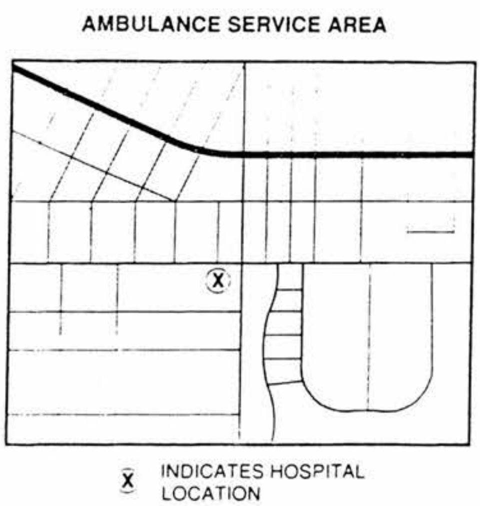
OUTPUT
DATA LAYER

POLYGON	COMBINATION	SUM
E	B-C	7
F	A-C	6
G	D-B	12
H	A-C	6
I	D-B	12
J	A-D	11

Fig. A7.5: Arithmetic Operations on Two Layers in the Vector Domain. To perform an overlay operation in the vector domain, polygons A and D in the input data layers must be subdivided or clipped to create the new boundaries for the output polygons (F,G,H,I,J). Then the addition operations is performed using the values from the attribute table. The clipping operation is complex and can require considerable processing time when there are large numbers of irregularly shaped polygons (Aronoff, 1989, p.210).

MEASUREMENT function includes distances between points, length of lines, perimeter of polygons or size of polygons or cells in a particular class. Its application may include area that are safe distance from a chemical waste disposal point, or open spaces of above a certain size to be upgraded, or a road under a certain size to be widened so as to enable domestic disposal trucks to make their rounds more conveniently. Three-dimensional measurement can be used to calculate the amount of earthwork involve in construction of a road or general surface remoulding.

NEIGBOURHOOD operation evaluates the characteristics of the area surrounding a specified location. This may involve counting the number of buildings within the vision cone of a particular look-out point, or number of buildings within a certain width from a river or a road. It can also be used to list out all entities within a certain designated locality, for example, the tree count. Another example is the assessment of the quality of an area as a wildlife habitát. Wildlife usually requires a specific combination of vegetation and terrain types with access to water, food, and shelter within a limited size of neighbourhood. Every neighbourhood function requires the specification of at least three basic parameters: one or more target locations, a specification of the neighbourhood around each target, and a function to be performed on the elements within the neighbourhood (Fig. A7.6).



AGE DISTRIBUTION OF RESIDENTS WITHIN 20 MINUTE SERVICE AREA

YEARS	POPULATION	PERCENT
0-5	200	16
6-10	100	8
11-15	50	4
16-20	25	2
21-30	300	23
31-40	250	19
41-50	100	8
51-60	175	13
60+	90	7
TOTAL	1290	100

Fig. A7.6: Neighbourhood Operation. The example above show a Twenty Minute Ambulance Service Area. To define the areas that can be reached by an ambulance within 20 minutes, a network function is used to evaluate travel times along the street network (Aronoff, 1989, p.214)

CONNECTIVITY functions include a few sub-types: a) contiguity function, b) proximity function, c) buffer zone function, d) routing allocation, e) spread function, f) seek or stream function and g) intervisibility analysis. As will be seen latter, some of these functions will be very useful in analyses undertaken in this study.

The functions use the accumulated values over the area being traversed. That is, it requires one or more attributes be evaluated and a running total of the results be retained in a step-by-step fashion. Each step represents a movement in space, such as a 100 m. segment of a street. The running total may be quantitave, such as the accumulated distance travelled or the accumulated travel time. In an analysis of historical or cultural spots within a study area, accumulated travel time will be more important to know in order to plan the alternative routes for sight-seeing. Fig. A7.7 shows an example of a cartographic modelling for route selection.

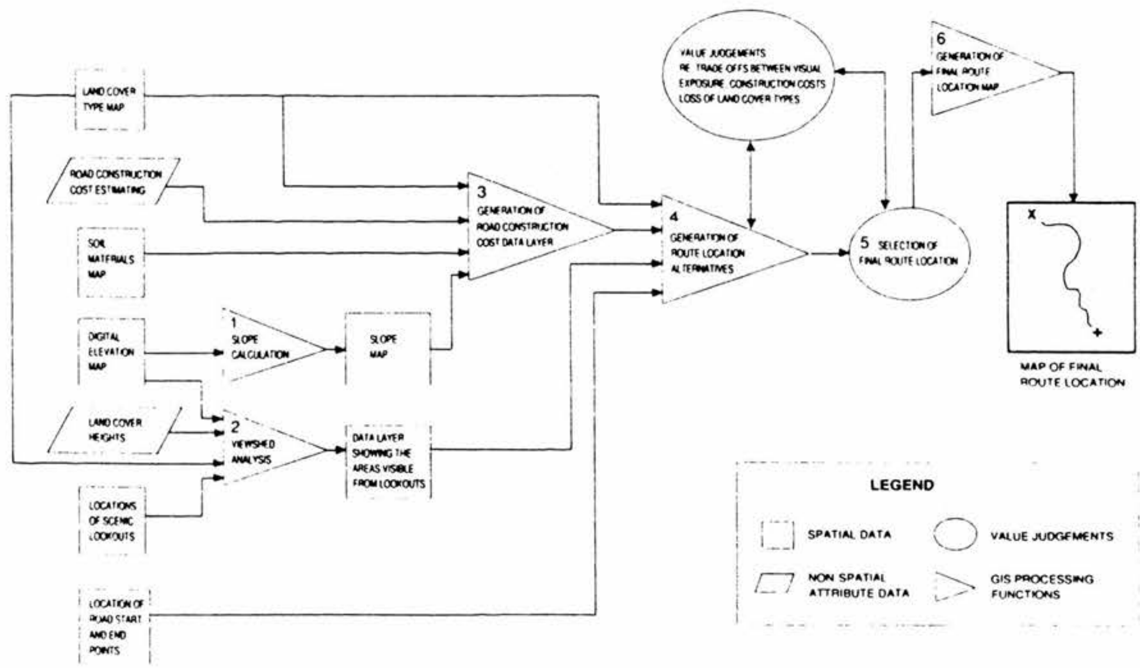


Fig. A7.7: Cartographic Modelling for Route Selection. The model seeks to define an optimum route with a given database (Aronoff, 1989, p.241)

In a **SEARCH** or stream function a directed search outward in a step-by-step manner from a start location using a specified decision rule can be used for example in tracing the flow pattern of water in a digital elevation model. The intervisibility function can be used to analyse the intervisibility of two separate points. This analysis can be very important in checking the impact of new development of a location on another. The buffering capability can be used to locate the extent of impact of certain action on a point or linear entities (Fig. A6.8). For example, one may be interested in finding the extent of influence of a chimney both visually and in pollution fall-out; or again a buffering analysis might be used to determined the extent of a certain setback policy on a river or even a street. Further analysis can be performed on elements or resources that fall within the buffer.

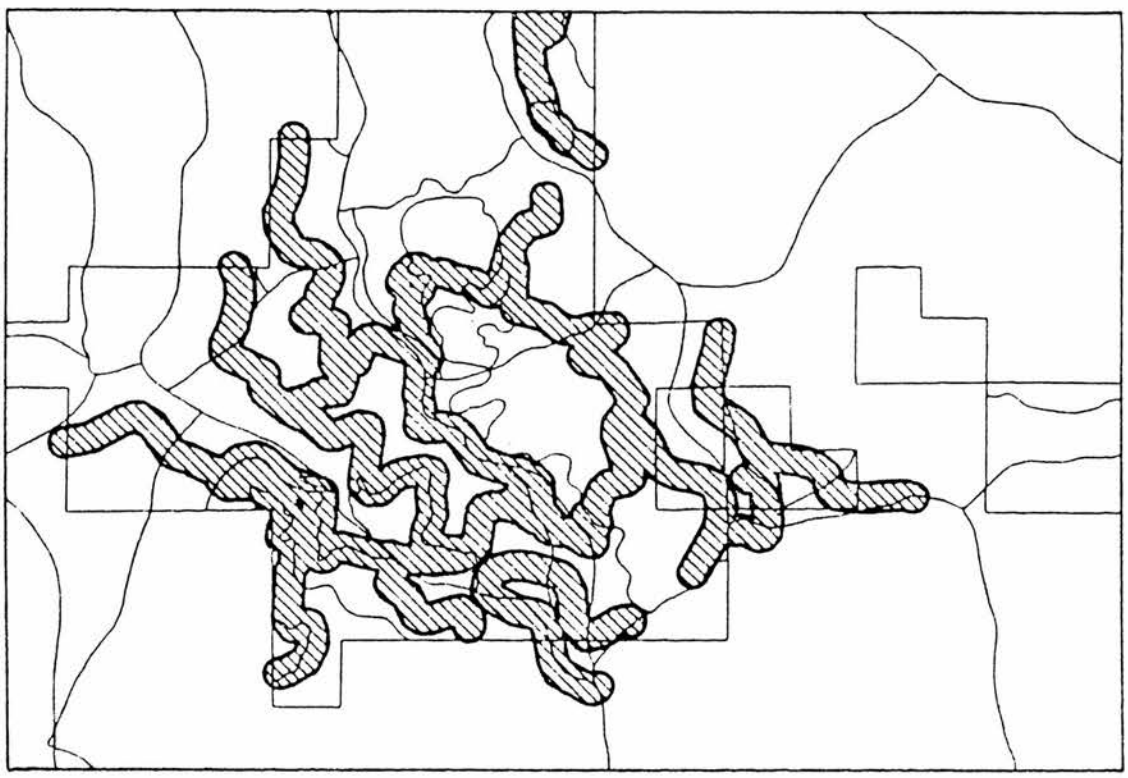
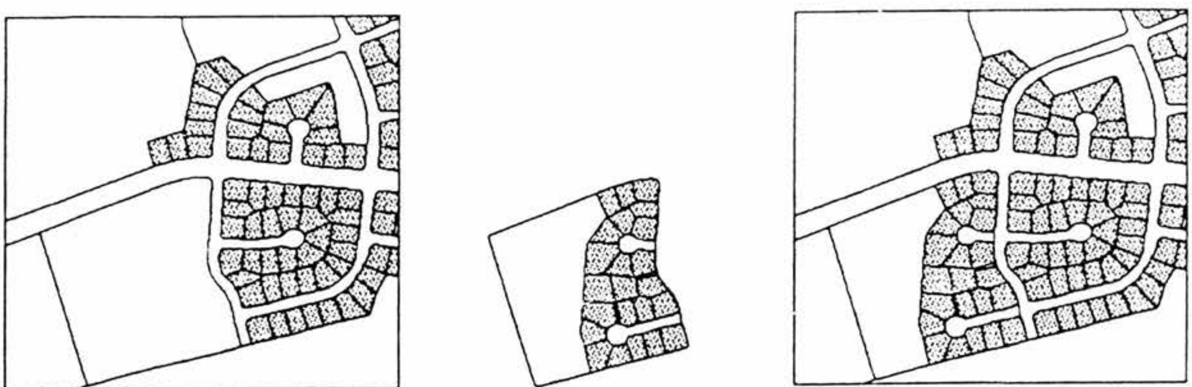


Fig. A7.8: Buffering Operation. The shaded area is where logging is prohibited due to criteria already set. Further analysis may be done to find out what are within the area (Aronoff, 1989, p.225)

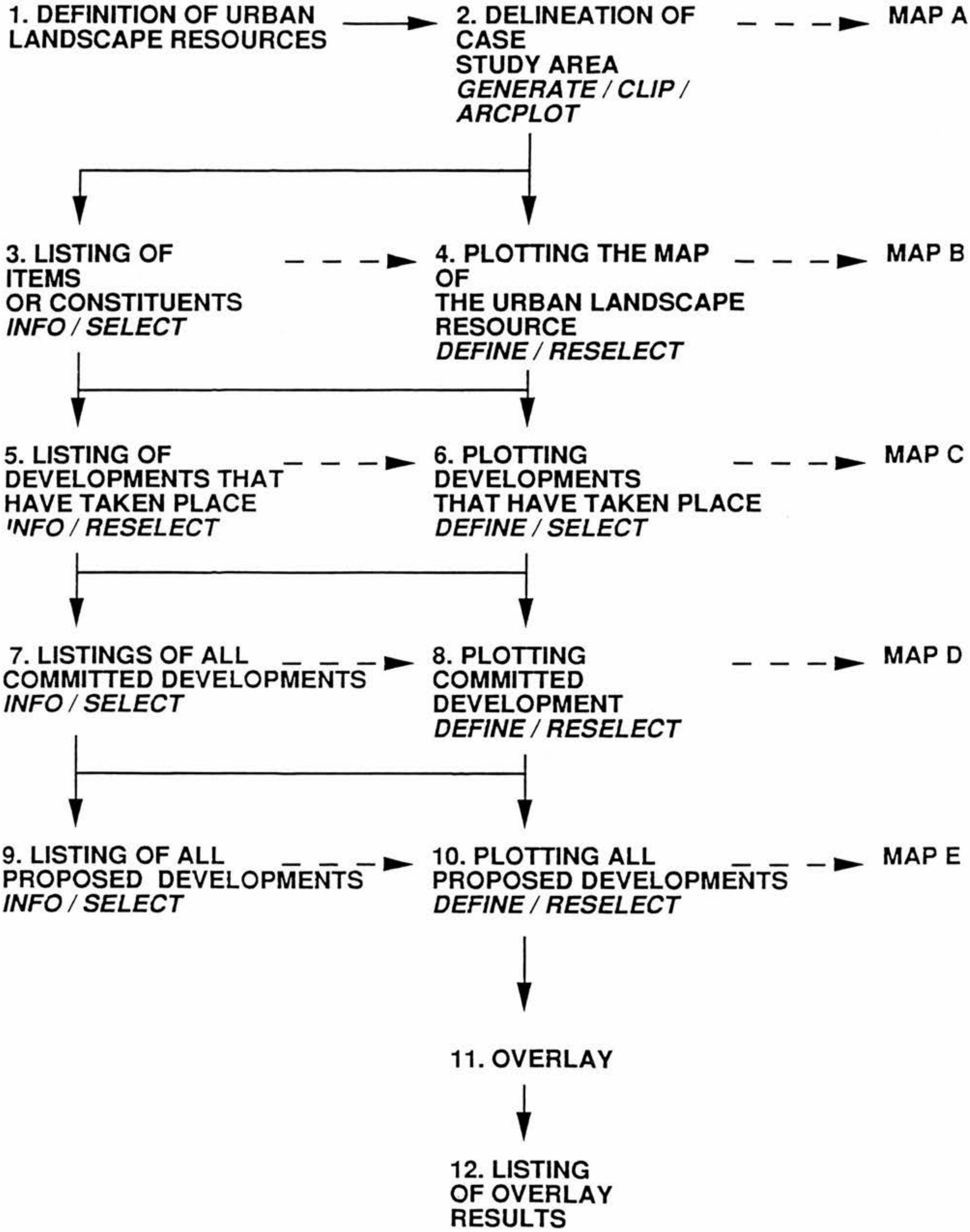
UPDATE is another very important function of Geographic Information Systems (GIS) that is extremely useful for urban planning, especially in relation to urban landscape resources. A coverage update can often be performed using topological overlay. This means that the new parcel are pasted onto the old parcel. In this way, all the relevant analysis such as determining resources lost through the development process over the old parcel can still have the information required. Fig. A7.9 shows an example of an UPDATE operation.



Parcel coverage before updating — New parcels — Parcel coverage after updating

```
Arc: UPDATE
Usage: UPDATE  <in_cover> <update_cover> <out_cover>
               {POLY|NET} {fuzzy_tolerance}
               {DROPBORDER}
Arc: UPDATE  OLDPARCELS  NEWPARCELS  PARCELS  NET
```

Fig. A7.9: Updating Operation. A development over a parcel may be fed into a database. Further analysis then can be done with the updated database which still retains the old information (ESRI, 1987, p.11-7).



APPENDIX 8: STEPS IN IMPACT ANALYSIS

Note:
italic show ARC/INFO Functions

APPENDIX 9: BENEFIT AND COST ANALYSIS

Below is shown the detail calculation of the financial benefit and cost of the alternative proposals for the management of Bukit Nenas Forest Reserve.

COST ELEMENTS:

TABLE A9.1: COST OF LAND ACQUISITION

Alternatives	Area Compulsorily Purchased (Hectares)	Amount (M$) (@M$200/sq.ft.)
Alternative 1	(11.63)*	(308,239,660)*
Alternative 2	5.60	148,421,500
Alternative 3	5.60	148,421,500
Alternative 4	11.63	308,239,660

Note: * Even though no acquisition is required for eco-toursim park itself, Alternative 1 incurs land cost by private development surrounding it.

Source: Adapted from Dept. of Planning (1982), **Kuala Lumpur Master Plan (Draft Report)**, DBKL, p.19

TABLE A9.2: CONSTRUCTION COSTS

Alternatives	Description of Work Involve	Estimated Cost
Alternative 1	Telecommunication Tower (1)	M$125,000,000
	Cable-car system (2)	M$ 1,000,000
	Nature Trail (3)	M$ 50,000
	8 units chalets (4)	@M$ 50,000
		M$ 400,000
	Others (5)	M$ 200,000
Sub-total		M$126,650,000
Alternative 2	Nature trail	M$ 50,000
	Perimeter fence	M$ 10,000
Sub-total		M$ 60,000

Alternative 3	16 units bungalows (6)	@M$	50,000
		M$	800,000
	4 units shophouses (7)	@M$	30,000
		M$	120,000
	1 folk museum (8)	M$	500,000
	Cable-car System	M$	1,000,000
	Nature Trails	M$	50,000
	Others	M$	200,000
Sub-total		M$	2,670,000
Alternative 4	16 units bungalows	@M$	50,000
		M$	800,000
	4 units shophouses	@M$	30,000
		M$	120,000
	(3) youth hostels	@M$	250,000
	& Training centre (9)	M$	750,000
	1 folk museum	M$	500,000
	Cable-car system	M$	1,000,000
	Nature Trails	M$	50,000
	Others	M$	200,000
Sub-Total		M$	3,420,000

Source: The figures above are adapted from:
(1) Talikom Malaysia; (2) Based on the former cable-car project on the site ran by UDA; (3) Based on the figure derived from similar project, namely Taman Sri Alam Ethno-Botanical Park, about 35 km. from Kuala Lumpur; (4) Based on the cost of building a small wooden Malay house (MHDA); (5) Guestimate; (6) Based on building a small single storey detached house (MHDA); (7) Based on building a unit shophouse; (8) Guestimate based on the restoration and adaptation work, plus furnishing exhibits; (9) Estimate of adaptation work.

TABLE A9.3: MAINTAINANCE COST

Alternatives	Maintainance Work		Estimated Amount (M$/year)
ALternative 1	Telecommunication Tower (1)	M$	2,500,000
	Cable-car system (2)	M$	500,000
	Nature trail (3)	M$	12,000
	8 units chalets (4)	@M$	12,000
		M$	96,000
	Others (5)	M$	25,000
Sub-total		M$	3,113,000
Alternative 2	General Maintainance (6)	M$	12,000
	Nature Trail	M$	12,000
Sub-total		M$	24,000

Alternative 3	16 units bungalows (7)	@M$	12,000
		M$	192,000
	4 units shophouses (8)	@M$	30,000
		M$	120,000
	1 folk museum (9)	M$	120,000
	Cable-car system	M$	500,000
	Nature Trail	M$	12,000
	Others	M$	25,000
Sub-total		M$	969,000
Alternative 4	16 units bungalows	@M$	12,000
		M$	192,000
	4 units shophouses	@M$	30,000
		M$	120,000
	Youth Hostel & Training centre (10)	M$	1,000,000
	1 folk museum	M$	120,000
	Cable-car system	M$	500,000
	Nature trail	M$	12,000
	Others	M$	25,000
Sub-total		M$	1,869,000

Sources: The figures above are adapted as below:
(1) Estimate by Talikom Malaysia; (2) Based on the figure from the former project ran by UDA on the same location; (3) Based on typical small landscape maintainance work (UTM); (4) Based on typical small building maintainance contract work (UTM); (5) Guestimate; (6) as in (3); (7) as in (4); (8) Based on the running cost of park centre at Taman Sri Alam, an ethno-park about 35 km. from Kuala Lumpur; (9) Based on the estimated maintainance cost of a small state museum; (10) Based on the running cost of the National Youth Cooperative (KOBENA) Training Centre, Skudai, Johore.

Table A9.4: FINANCIAL BENEFIT

Alternative	Elements of Revenue	Estimated Revenue (M$/year)	
Alternative 1	Viewing Tower (1)	M$	120,000
	2 resturants (2)	@M$	300,000
		M$	600,000
	8 units chalets (3)	@M$	15,000
		M$	120,000
	Cable-car system (4)	M$	170,000
Sub-total		M$	1,101,000

Alternative 2	-	M$	0
Sub-total		M$	0
Alternative 3	16 units bungalows (5)	@M$	15,000
		M$	240,000
	4 units shophouses (6)	@M$	60,000
		M$	240,000
	1 unit folk museum (7)	M$	12,000
	Cable-car system	M$	170,000
Sub-total		M$	700,000
Alternative 4	16 units bungalows	@M$	15,000
		M$	240,000
	4 units shophouses	@M$	60,000
		M$	240,000
	1 unit folk museum	M$	12,000
	Youth Hostel (8)	M$	225,000
	Youth Training (9)	M$	60,000
	Cable-car system	M$	170,000
Sub-total		M$	947,000

Notes: (1) The revenue from the telecommunication tower estimated at M$25m. per year is discounted because the tower could be sited anywhere independent of the site; (2) Guestimate of M$25,000 per month; (3) Tenancy rate for the bungalow and chalet are assumed as the same at 50% and rate of M$150.00 per day; (4) Assumption of 100 riders per day at M$5.00 per ride as in Genting Highland Resort which is about 25 km. from Kuala Lumpur; (5) Assumed the same as (3); (6) Assumption turn-over of M$5,000 per month; (7) Assumption of a modest M$1,000 per month; (8) Assumption of 50 persons x 15 days/month x M$25.00 per day x 12 months; (9) Youth training at M$500 per semester x 2 per year x 30 per intake x 2 per year.

The Malay Mail, Wednesday, June 12, 1991

BEAUTIFUL GOMBAK RIVER

- By P. SELVARANI

Riverine gardens and park by Year 2001

Haji Khuzaimah: *More functional ecosystem*

THE scene along the Gombak River will be picturesque with gardens, wildlife park and pedestrian malls.

This is provided for under a 10-year programme dubbed City Greenery Programme. The project is expected to take off next year once the allocation under the Sixth Malaysia Plan is given.

City Hall Parks and Recreation Deparment director Haji Khuzaimah Yunos said City Hall would work together with the Drainage and Irrigation Department which is supervising the project.

"The DID has already started work in deepening the river and strengthening its banks under the Kuala Lumpur Flood Mitigation Project. The riverine beautification programme will complement this project.

Haji Khuzaimah said the greenery programme, aimed at reforesting the city and bringing back a more functional eco-system, is also to do away with ugly riverine squatters and dumping grounds.

The beautification programme will be carried out on the river reserve within the city until the Selangor border.

"The beautification concept will be different in each area," he said.

"For example, areas nearer the city centre will be developed into scenic riverine parks complete with pedestrian malls and rest and recreation areas," he said.

Shrubs

Areas farther away from the city centre will be developed into secondary and primary forest reserves to keep the environment as natural as possible.

"We hope to turn these areas into some sort of bird-park or even a sanctuary for wildlife," he said.

However, the banks which are too narrow for proper development will be planted with trees and beautiful shrubs.

Haji Khuzaimah said City Hall had already embarked on its own beautification programme by planting an average of 10,000 trees per year in the city.

So far this year, the authority has planted 6,000 trees in all open spaces under its jurisdiction.

NEW STRAITS TIMES, MONDAY, SEPTEMBER 17, 1990

imesnational

Call to have ecological data base

DATUK DR SALLEH
...impact on environment

ALA LUMPUR, Sun. — The Gov ment has been urged to form a tral body that can provide data e on the country's ecologically angered sites.

irector-general of the Forestry search Institute of Malaysia RIM) Datuk Dr Salleh Mo nmed Nor said although such in mation was available in certain vernment departments, it was, vever, dispersed, making it diffi for any developer to obtain data.

For example, if you want to build oad through a tunnel, the com er can give you information on areas that would have a negative act on the environment," he said is talk on forest conservation to nbers of the Pan-Pacific South t Asia Women's Association yes lay.

his would ensure that no develop nt projects were implemented on se areas.

e said although by law it was ndatory for developers to conduct environmental impact assessments on the proposed sites, poor enforcement of this legislation had enabled developers to work around it.

Datuk Dr Salleh said the Government's tendency to invite foreign experts to conduct feasibility studies before embarking on certain projects was not practical at times as these experts come from temperate regions and therefore were insensitive to the local climate.

Heritage

"As a result, the full implication of our climatic conditions on these proposed projects are sometimes not felt, producing hazardous results in the long run."

However, he assured that Malaysia was fully aware of the current global environmental problems that threatened mankind and life on earth.

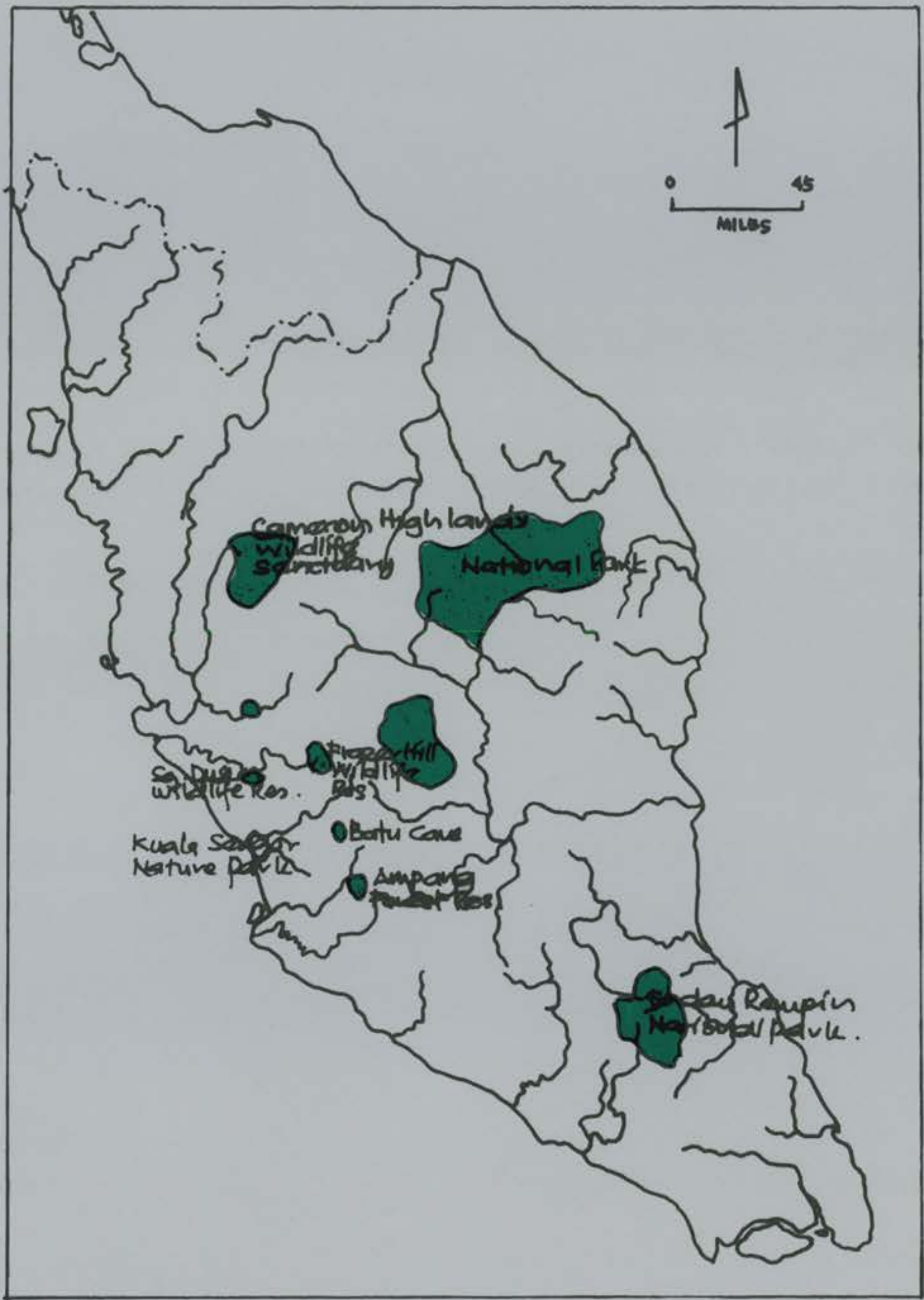
"The country is fully committed to conserving its natural resources and the protection of its environment from degradation.

"It has also recognised that the rainforests it has been endowed with represents its natural heritage and, besides the economic forest products, these forests provide essential ecological services as well as nature's storehouse of biological species and genetic resources."

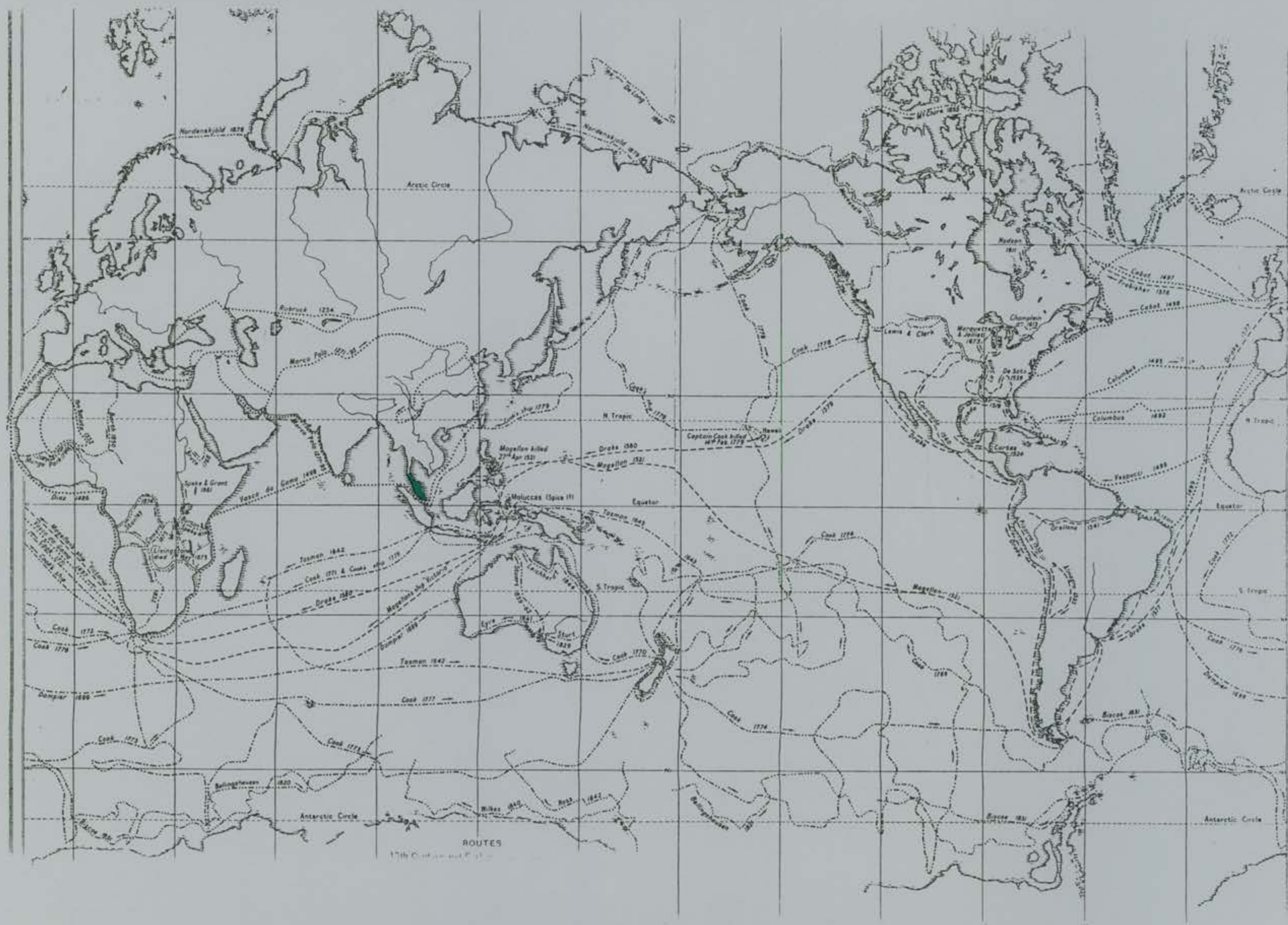
Yet, he said, Malaysia was also aware that there had to be sustainable social and economic development in order to be able to provide adequate inputs to protect and sustain the quality of its environment.

"In so doing, Malaysia has strived towards the sustainable management of its natural heritage."

He said before any conservation groups could lobby for any projects to be stopped, they should first come up with alternatives or solutions to these problems. This will give more credibility and attention to their requests.



APPENDIX 11: NATIONAL PARKS AND RESERVES OF PENINSULAR MALAYSIA
(Source: Perhilitan, Malaysia, 1992)



APPENDIX 12: **THE MEETING PLACE**: The Malay Peninsular has "destined from time immemorial to play an important role as a transition area for products of East and West, and a meeting ground for merchants coming from all directions" (Meilink-Roelofsz (1962). The map above shows the important explorations of the world, which the sea spice route around the peninsular predated.

APPENDIX 13: <u>KUALA LUMPUR AND ITS ENVIRON:</u> From a modest beginning as a tin mining post, Kuala Lumpur has grown into a city surrounded by suburban developments. In the process many of its landscape resources, including former mining lands that have provided habitat for wildlife in the city are now taken up by housing. It is now about to lose its other landscape resources such as remnant forest, river corridor and colonial shophouses due to planning short-sightedness.